

(19)日本国特許庁 (J P)

(12) 公 開 特 許 公 報 (A)

(11)特許出願公開番号

特開平6-336328

(43)公開日 平成6年(1994)12月6日

(51)Int.Cl. ⁵	識別記号	序内整理番号	F I	技術表示箇所
B 6 5 G 43/08	F			
B 2 9 D 30/30		7158-4F		
30/44		7158-4F		
B 6 5 G 15/28		7030-3F		

審査請求 未請求 請求項の数4 O L (全 11 頁)

(21)出願番号 特願平5-285000

(22)出願日 平成5年(1993)11月15日

(31)優先権主張番号 特願平5-76734

(32)優先日 平5(1993)4月2日

(33)優先権主張国 日本(J P)

(71)出願人 000005278

株式会社ブリヂストン

東京都中央区京橋1丁目10番1号

(72)発明者 石渡 隆

東京都目黒区東山3-17-8

(72)発明者 長野 潤

埼玉県所沢市中富南4-2-1-402

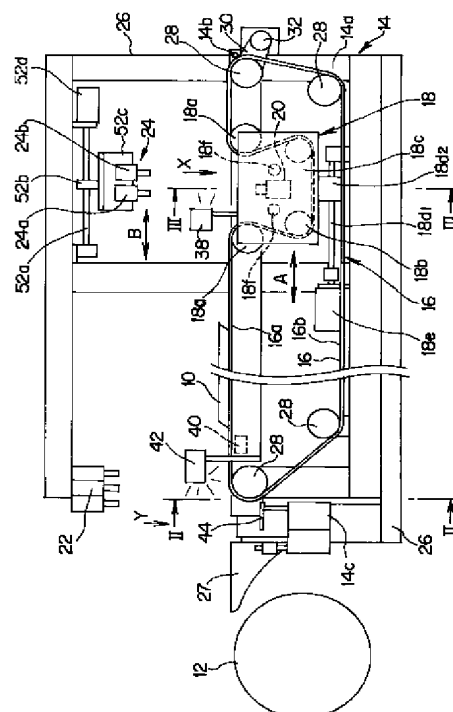
(74)代理人 弁理士 藤本 博光 (外2名)

(54)【発明の名称】 コンベア搬送装置及びコンベア搬送装置の搬送対象物検出装置

(57)【要約】

【目的】 搬送対象の帯状対象物の後端部把持をやりやすくと共に、搬送対象の帯状部材の下方からの検出を可能として、搬送対象物の高精度の検出つまり長さの検出を可能として、したがって、帯状部材の貼り付け作業の円滑化かつ迅速化を図り得るコンベア搬送装置及びコンベア搬送装置の搬送対象物検出装置を提供する。

【構成】 搬送対象物を目的位置まで搬送する往路16a、及び、搬送後引き返す復路16bからなるコンベア帯16を備えたコンベア搬送装置14において、往路16aの途中に、コンベア帯16を下方に凹ませて該コンベア帯16で囲まれる空間を形成するコンベア帯空間形成手段18と、形成された空間内に設けられて、往路16a上に載置された搬送対象物を検出する対象物検出手段20とを備えた。



【特許請求の範囲】

【請求項1】 中央部ローラコンベアと、該ローラコンベアの左右に位置する少なくとも一対のベルトコンベアとからなる、帯状対象物を搬送する装置であって、上記ベルトコンベアは対象物を駆動し目的位置まで搬送する往路、及び、搬送後引き返す復路からなり、このうち往路の途中にはベルトコンベアを下方に凹ませて該ベルトコンベアで囲まれた空間を形成し、該空間の搬送方向の前後は、ローラコンベアがブリッジ状に延びることを特徴とするコンベア搬送装置。

【請求項2】 搬送対象物を目的位置まで搬送する往路、及び、搬送後引き返す復路からなるコンベア帯を備えたコンベア搬送装置において、往路の途中に、コンベア帯を下方に凹ませて該コンベア帯で囲まれる空間を形成するコンベア帯空間形成手段と、形成された空間内に設けられて、往路上に載置された搬送対象物を検出する対象物検出手段と、を備えたことを特徴とするコンベア搬送装置の搬送対象物検出装置。

【請求項3】 請求項1において、搬送対象物は帯状部材であり、かつ、対象物検出手段は搬送対象物の後端を撮像して検出するものであることを特徴とするコンベア搬送装置の搬送対象物検出装置。

【請求項4】 請求項1または2において、コンベア帯空間形成手段または対象物検出手段の少なくともいずれかを、搬送方向に沿って移動させるための手段を備えたことを特徴とするコンベア搬送装置の搬送対象物検出装置。

【発明の詳細な説明】

【0001】

【産業上の利用分野】本発明は、コンベア搬送装置及びコンベア搬送装置の搬送対象物検出装置に係り、詳しくは搬送対象物を目的位置まで搬送する往路、及び、搬送後引き返す復路からなるコンベア帯を備えたコンベア搬送装置であって帯状部材供給装置に用いるのに好適な、コンベア搬送装置及びコンベア搬送装置の搬送対象物検出装置に関する。

【0002】

【従来の技術】一般に、タイヤ（空気入りタイヤ等）の成型工程においては、帯状部材例えばトレッドゴムを成型ドラムで貼り付けて生タイヤを成型している。この成型に際しては、前記帯状部材を成型ドラムに向けて供給する必要があるため、帯状部材供給装置が用いられている。この帯状部材供給装置は、前記帯状部材をその供給方向に搬送する手段を有しており、この搬送手段の一つに、コンベアベルト（コンベア帯に相当）により帯状部材を搬送する周知のベルトコンベア装置がある。

【0003】この種のベルトコンベア装置を有する帯状部材供給装置は、従来、例えば図13に示す構成になっ

ている。図13の帯状部材供給装置は、主に、帯状部材aを成型ドラムbの周上ないし近傍の目的位置まで搬送するための、ほぼ水平方向に沿って施設されたベルトコンベア装置cと、該ベルトコンベア装置cの上方から帯状部材aの先端部または後端部等を撮像するための、工業用カメラ等の撮像機d1、d2と、下部構造でベルトコンベア装置cを支持し、かつ、上部構造で撮像機d1、d2を支持する等、帯状部材供給装置各部を支持・固定するフレームeとを備える。また、前記ベルトコンベア装置cは、帯状部材aを載置して、搬送路上の目的位置まで搬送する往路f1、及び、搬送後引き返す復路f2からなるコンベアベルトfと、フレームeに回動自在に支持されて、前記コンベアベルトfを支持・誘導するプーリ（ローラ）g、前記コンベアベルトfにタイミングベルトhを介して駆動力を付与するベルト駆動モータiとを有して構成される。

【0004】図13の帯状部材供給装置は、帯状部材aを成型ドラムbに供給するに際し、まず、帯状部材aをコンベアベルトfの往路f1上に載置した状態で成型ドラムb方向（搬送方向）へ搬送する。次いで、図示されないセンサで帯状部材aの先端を検出して、該センサの検出信号に基づき、該帯状部材aの先端部が目的位置まで移動したときに搬送を停止する。その後、撮像機d1、d2の撮像画像情報や、予め知られている各撮像機d1、d2の間隔に基づき、帯状部材aの長さを測定し、この長さの測定結果から帯状部材aの設定長さに対する過不足を求める。次いで、帯状部材aの成型ドラムでの貼り付けを、貼り付け終了時に前記過不足が零になるように行う（例えば特開平4-347630号公報参照）。該公報には、前記帯状部材aの後端部を把持爪で把持し、把持爪で帯状部材aを引っ張りあるいは押し縮める等して帯状部材aを引き伸ばすことにより、前記過不足分を補って帯状部材aの貼り付けを行う技術が開示されている。

【0005】前記のようなタイヤ成型に用いられる帯状部材aは、図13に示されるように、その先端部及び後端部の各端面a1及びa2は、帯状部材の上面側が後ろ向きになるように傾斜したものとされている。成型ドラムbにおける貼り付け時には、この各端面a1及びa2同士を隙間なく密着させることが要請される。このように密着をさせるためには、先端部端面a1の下部のエッジ（帯状部材a下面側の先端）と後端部端面a2の下部の稜線（該端面a2と帯状部材下面との境）とが一致するように貼り付けなければならない。したがって、成型前には、帯状部材aの前記エッジ及び稜線のそれぞれの正確な位置を検出する必要がある。また、正確な位置を検出したら把持爪で帯状部材aを位置がズレないように把持する必要がある。

【0006】

【発明が解決しようとする課題】しかしながら、前記従

来の帯状部材供給装置においては、帯状部材aの前記稜線を正確に検出できず、帯状部材の貼り付けを精度良く行い難いという問題点がある。また、帯状部材aの後端部を把持爪で把持するときに後端部がコンベア上に乗っていると、帯状部材aの下部に下爪を入れるときに帯状部材aの位置がズレないように入ることが難しいという問題がある。すなわち、前記各撮像機d1、d2は、帯状部材aの上方に臨んで該帯状部材aの先端部及び後端部を撮像して検出する。このため、該帯状部材a先端部端面a1は斜め上方を向いているためエッジ検出に問題が生じにくい、前記帯状部材a後端部端面a2は斜め下方を向いているため前記稜線の検出ができない。また、前記稜線のみならず、前記後端部端面a2の表面状態も検出できればそれが貼り付けに有用な情報となり得るが、従来のベルトコンベア装置を備えた帯状部材供給装置では、そのような情報は得られなかった。

【0007】また、従来の帯状部材供給装置において、種々の長さの帯状部材を次々に搬送しなければならない場合、当該帯状部材供給装置では各帯状部材の長さに対応した検出箇所に撮像機を迅速に設定することが困難なため、各帯状部材部材の長さを測定することは困難であり、帯状部材例えばトレッドゴムを成型ドラムに貼り付ける作業が滞る恐れがあるという問題点があった。

【0008】また、一般的なベルトコンベア装置において、搬送対象物の検出は、該搬送対象物の上方もしくは側方から行われている。したがって、該搬送対象物の下方からの検出はできず、搬送対象物の下面や下方に向けた後端の検出が不可能であった。また、上方から搬送対象物を検出していたのでは、コンベア搬送装置の上方に検出手段を備えるための種々の設備を要し、設備が大型かつ複雑化しやすいという問題点があった。

【0009】本発明は前記従来の問題点を解消するべくなされたものであって、その目的は、搬送対象物の帯状対象物の後端部把持をやりやすくするコンベア搬送装置を提供することである。また、搬送対象物例えば帯状部材の下方からの検出を可能として、搬送対象物の高精度の検出を可能とすると共に、搬送対象物の後端部把持をやりやすくするコンベア搬送装置の搬送対象物検出装置を提供することである。また、帯状部材の貼り付け作業の円滑化かつ迅速化を図り得るコンベア搬送装置の搬送対象物検出装置を提供することである。また、搬送対象物の長さに対応して精度良く検出できるコンベア搬送装置の搬送対象物検出装置を提供することである。

【0010】

【課題を解決するための手段】本発明は前記目的を達成するため次の構成を有する。すなわち、請求項1の発明は、中央部ローラコンベアと、該ローラコンベアの左右に位置する少なくとも一对のベルトコンベアとからなる、帯状対象物を搬送する装置であって、上記ベルトコンベアは対象物を駆動し目的位置まで搬送する往路、及

び、搬送後引き返す復路からなり、このうち往路の途中にはベルトコンベアを下方に凹ませて該ベルトコンベアで囲まれた空間を形成し、該空間の搬送方向の前後は、ローラコンベアがブリッジ状に延びることを特徴とするコンベア搬送装置である。

【0011】また、請求項2の発明は、搬送対象物を目的位置まで搬送する往路、及び、搬送後引き返す復路からなるコンベア帯を備えたコンベア搬送装置において、往路の途中に、コンベア帯を下方に凹ませて該コンベア帯で囲まれる空間を形成するコンベア帯空間形成手段と、形成された空間内に設けられて、往路上に載置された搬送対象物を検出する対象物検出手段と、を備えたことを特徴とするコンベア搬送装置の搬送対象物検出装置である。

【0012】また、請求項3の発明は、搬送対象物は帯状部材であり、かつ、対象物検出手段は搬送対象物の後端を撮像して検出するものであることを特徴とするコンベア搬送装置の搬送対象物検出装置を構成するものである。

【0013】また、請求項4の発明は、コンベア帯空間形成手段または対象物検出手段の少なくともいずれかを、搬送方向に沿って移動させるための手段を備えていることを特徴とするコンベア搬送装置の搬送対象物検出装置を構成するものである。

【0014】

【作用】請求項1の発明においては、往路の途中にベルトコンベアで囲まれた空間を形成し、かつ、該空間の搬送方向の前後はローラコンベアがブリッジ状に延びるので、ベルトコンベアに邪魔されずにその空間に把持手段を入れて帯状対象物を把持でき、したがって、搬送対象物の帯状対象物の後端部の把持をやりやすくなる。また、請求項2の発明においては、往路の途中に、コンベア帯を下方に凹ませて該コンベア帯で囲まれる空間を形成し、形成された空間内に対象物検出手段を備えるので、コンベア帯の往路上に搬送される搬送対象物を下方から検出することができるようになる。したがって、従来できなかった搬送対象物の正確な検出ができるようになる。また、ベルトコンベアに邪魔されずにその空間に把持手段を入れて帯状対象物を把持でき、したがって、搬送対象物の帯状対象物の後端部の把持をやりやすくなる。

【0015】また、請求項3の発明のように、搬送対象物を帯状部材とし、その後端を撮像して検出できるようにすれば、帯状部材の後端切断面が下方に向いていても、帯状部材後端を正確に検出することができ、さらには、精度良く帯状部材の長さを検出することができる。したがって、帯状部材の成型ドラムに貼り付ける作業が滞ることがない。また、請求項4の発明のように、対象物検出手段を、搬送方向に沿って移動が可能なものにすれば、長さの異なる帯状部材を混在して搬送する場合に、搬送前あるいは搬送中に対象物検出手段の位置を帯

状部材の長さに適合した位置に移動させることができたため、各带状部材の長さを正確に測定することができる。

【0016】

【実施例】以下図面を参照して、本発明の実施例を詳細に説明する。この実施例は、本発明に係るコンベア搬送装置の搬送対象物検出装置を採用した带状部材供給装置である。図1は実施例の带状部材供給装置の側面構成を示し、図2ないし図12は前記带状部材供給装置の各部構成または作動説明図を示す。なお、以下の説明において、「前」、「後」は搬送方向に沿って先、後、「右」、「左」方向は搬送方向を含むほぼ水平面内で搬送方向に向いて右、左、「上」、「下」は垂直方向に沿って上、下を表している。

【0017】図1に示すように、前記带状部材供給装置は、主に、タイヤのトレッドゴム等の带状部材10を成型ドラム12の近傍の目的位置まで搬送するための、ほぼ水平方向に沿って施設されたベルトコンベア装置14と、該ベルトコンベア装置14の、往路16aの途中でかつ後部側に設けられた、コンベアベルト16を下方に凹ませて該コンベアベルト16で囲まれる空間を形成するコンベアベルト空間形成部18と、形成された空間内に設けられて、コンベアベルト往路16a上に載置された带状部材10の後端部を検出のために下方から撮像する後端部検出撮像機20と、前記ベルトコンベア装置14の前部や後部の上方に配設されて上方から带状部材10の先端部、後端部の標識線等を撮像するための、工業用カメラ等の撮像機群22、24と、下部構造でベルトコンベア装置14を支持し、かつ、上部構造で撮像機群22、24を支持する等、带状部材供給装置の各部を支持・固定する装置フレーム26と、ベルトコンベア装置14及び成型ドラム12の間に設けられた、搬送された带状部材10を成型ドラム12の周面上部に導くためのサーバコンベア27とを備える。

【0018】前記ベルトコンベア装置14は、主に、各部を支持・固定するコンベアフレーム14aと、带状部材10を載置して搬送路上の目的位置まで搬送する往路16a、及び、搬送後引き返す復路16bからなるベルトコンベア16と、前記コンベアフレーム14aに回動自在に支持され、前記コンベアベルト16に転接して前記コンベアベルト16を支持・誘導するプーリ（ローラ）28と、前記コンベアベルト16にタイミングベルト30を介して駆動力を付与するベルト駆動モータ32とを有して構成される。なお、図1において、14bは左右方向に軸方向が沿う、前記コンベアフレーム14aの後端部に設けられたベルトコンベア装置14の回動中心軸である。また、14cは、前記ベルトコンベア装置14を前記中心軸14bを中心にして上下方向を含む平面に沿って回動させ、搬送方向先端位置を上下動させるためのコンベア上下駆動部である。このコンベア上下駆動部14cの詳細は後述する。

【0019】前記プーリ28は、ベルトコンベア装置14の上部と下部に配列され、かつ、上部配列が前記搬送路に沿い、下部配列が上部配列の下方にあるように配列される。実施例では、前記プーリ28は、上部配列にコンベア搬送路の前端部と後端部の2箇所に配設されるが、必要に応じて適宜の箇所に配設できる。また、プーリ28の下部配列は、上部配列よりやや前後方向内側に配列される。

【0020】図1のII-II線視図である図2に示すように、前記ベルトコンベア装置14には、その幅方向中央部に、ローラコンベア34が配設されている。このローラコンベア34は、複列かつ多数の円板形状のローラ（円形ローラ）34aが搬送方向に沿って配列されてなり、かつ、ベルトコンベア装置14とほぼ同一かあるいは長い長さのものである。また、ローラコンベア34の各円形ローラ34aは、搬送方向直角断面が上方に開いたコの字形状でかつ長手方向にほぼ同形の型材からなるローラ支持部材34bの両側の内側面に回動自在に軸支される。また、該各円形ローラ34aは、その回転方向が前記搬送方向に対応し、かつ、その上部接線は、前記コンベアベルト往路16aの上部平面に一致される。なお、ローラコンベア34は、前記中心軸14bを中心として全体的にかつベルトコンベア装置14とともに回動して前端部が上下動するようになっている。

【0021】前記コンベアベルト16は、複列（複数本）のベルトが平行に送られるようになっており、この実施例では、前記ローラコンベア34を挟んで搬送方向左右に3列づつ合計6列（6本）のベルトからなっている。なお、コンベアベルト16のベルト列の数は前記6列に限定されず、片側または両側のベルト列数が1、2列あるいは4列以上でも良い。

【0022】前記コンベアベルト空間形成部18は、前記ベルトコンベア装置14のコンベアベルト往路16aのほぼ後部に配設され、主に、上部プーリ18a及び下部プーリ18bと、ボックス部材18cと、ボックス移動部材18dと、駆動モータ18eとを有している。前記上部プーリ18a及び下部プーリ18bは、それぞれ搬送方向に沿って間隔をおいて2個ずつ設けられる。また、前記上部プーリ18a及び下部プーリ18bは、コンベアベルト16の往路16aを下方に凹ませてコンベアベルト16で囲まれる空間を形成するようにコンベアベルト16を誘導する。すなわち、前記上部プーリ18aは、コンベアベルト16の往路16aを誘導するプーリ28と平行かつ同一平面に位置し、前記下部プーリ18bは、コンベアベルト16の復路16bのやや上方にかつ上部プーリ18aに平行に位置する。これら上部プーリ18a及び下部プーリ18bは、次のようにコンベアベルト16が巻き掛かることにより、コンベアベルト16で囲まれる空間を形成する。つまり、搬送方向に沿って見て行くと、往路16aのコンベアベルト16は、

まず、搬送方向後部側の上部プーリ18aにより下方に向きを変えられ、次いで、搬送方向後部側の下部プーリ18bにより搬送方向に向きを変えられ、さらに、搬送方向前部側の下部プーリ18bにより上方に向きを変えられ、次いで、搬送方向前部側の上部プーリ18aにより搬送方向に向きを変えられる。

【0023】図1のIII-III線断面図の図3に示すように、前記ボックス部材18cは、ほぼ長方形の板部材からなる側壁部18c1が搬送方向及び上下方向を含む平面に平行となるようにコンベアベルト16の両側に配設され、かつ、該両側壁部18c1の下部が、コンベアベルト16の往路16a及び復路16b間を貫く連結部材18c2により連結されて構成されたものであり、搬送方向から見た断面形状が上方に開くほぼコの字形状を呈している。前記ボックス部材18cの両側壁部18c1に上部プーリ18a及び下部プーリ18bのプーリ軸の両端部が嵌合されている。また、各プーリ18a及び18bはそのプーリ軸に対してベアリングにより回転可能にされているため、各プーリ18a及び18bはボックス部材18cに対して回転自在になっている。また、前記連結部材18c2には、その上面に前記後端部検出撮像機20と帯状部材10に下方から光を照射する第1の照明器18fとが前記空間に内包されるように固定される。

【0024】なお、図3に示すように、前記のコンベアベルト16で囲まれる空間は、各上部プーリ18aに巻き掛かるコンベアベルト16及び前記側壁部18c1で囲まれる領域が上方に開口する開口部35を有している。ただ、その開口部35には、例えば乳白色のアクリルからなる第1の参照板36がローラコンベア34の両側にコンベアベルト往路16aのレベルよりやや下側のレベルに配設される。このように配設するのは、帯状部材10後に後部を後述する図10及び図11で示す、把持手段(ロボットハンド)60の把持具61で把持する際に参照板36が邪魔にならないようにするためである。また、ボックス部材18cには、前記往路16aの幅方向外側かつ上方から前記開口部35に向けて光を照射する第2の照明器38が配設される。

【0025】前記ボックス移動部材18dは、図1に示すように、前記ボックス部材18c下方に配設されており、前記ボックス部材18cの移動方向(つまり前記搬送方向と同じ)に沿う軸のネジ棒(スクリュウロッド)18d1と、該ネジ棒18d1の外周に咬み合って該ネジ棒18d1の回転によりその軸方向に進退動する(図1中矢印A方向に動作)被動ネジ部材18d2とからなっている。ネジ棒18d1の一端は駆動モータ18eにカップリングを介して接続され、他端はコンベアフレーム14aの下部上面に回転可能に支持される。また、前記被動ネジ部材18d2は前記ボックス部材18cの下部に固定される。したがって、ボックス部材18cは駆

動モータ18eの回転駆動により搬送方向に進退動可能になっている。なお、前記ネジ棒18d1と駆動モータ18eとは前記のようにカップリング結合される他、プーリ及びタイミングベルトにより駆動力を伝達するように構成され得る。

【0026】図1のX方向視図の図4及び図4のV-V線断面視図の図5に示すように、前記ローラコンベア34のローラ支持部材34bの下部構造は、前記後端部検出撮像機20が移動する間の視野に対応する部分が欠如しており、上下方向に貫通する空間39を有する構成とされる。これにより、前記後端部検出撮像機20は、その視野が遮られることがないため、前記空間39を介して、ローラコンベア34の上方を臨むことができる。したがって、前記後端部検出撮像機20は、このローラコンベア34上に搬送される帯状部材10の後端部を撮像できる。また、第1の照明器18fは搬送方向に沿って2つ配設されており、その1つは帯状部材10の下面(図5で10aで示す)を照射し、他の1つは帯状部材10の後端面(図5で10bで示す)を照射するようにになっている。このような照射により、帯状部材10の下面と後端面との間の稜線を浮き出させて明確化することができる。

【0027】図1に示すように、前記ベルトコンベア装置14の往路16aの前端部近傍には、搬送されてくる帯状部材10の前端部を検出する部材検出器40が配設される。また、この部材検出器40のやや前方には、前記ベルトコンベア装置14の前端部を上方から照射する第3の照明器42が配設される。また、図1のY方向視図である図6または図7に示すように、ローラコンベア34は、その前端がコンベアベルト16の前端とほぼ一致するように配置したり、または、ローラコンベア34の前端がコンベアベルト16の前端より前方になるように配置したりすることができる。また、前記ベルトコンベア装置14及びローラコンベア34の前端部の下部には、例えば乳白色のアクリルからなる第2の参照板44が配設されており、これにより、帯状部材10を撮像する際の白黒のコントラストが明確化する。また、図6に示すように、ローラコンベア34の前端がコンベアベルト16の前端より前方になるように配置された場合、ローラコンベア34の前端部のローラ支持部材34bは、その下部構造が切り欠かれおり、当該ローラコンベア34の内側を通じて上方に繋がる第2の空間46が形成されている。この第2の空間46を介して前記第2の参照板44が上方に臨むようになっている。図8は、帯状部材10がコンベアベルト16前端より前方に進んで帯状部材10の前端部が前記第2の参照板44上に臨んだ状態例を示す。

【0028】前記ベルトコンベア装置14の前端部に設けられたコンベア上下駆動部14c及びサーバコンベア27の詳細な構成は図9に示すようになっている。図9

に示すように、コンベア上下駆動部14cは、前記フレーム26前端部に後方に向けて回動自在に取り付けられた、上下方向に沿う軸のネジ棒（スクリュウロッド）14c1と、該ネジ棒14c1の外周に咬み合って該ネジ棒14c1の回転により上下動する被動ネジ部材14c2と、被動ネジ部材14c2に回動可能にシリンダが取り付けられ、かつ、ロッド上部がローラコンベア34の下部にリンク結合されたシリンダ部材14c3からなる。また、前記サーバコンベア27は、上部に搬送方向に沿って配列された複数の円筒形のローラ27aと、上部で該ローラ27aを回動自在に支持し、かつ、左右側面から見て上部が前方に突き出るように延びて下方に行くにしたがって後退して行く形状のサーバフレーム27bとを有している。このサーバフレーム27bは、フレーム26の前端部に上下に摺動可能に取り付けられている。該フレーム26の前端部には、サーバコンベア27を上下動させるためのサーバ上下動部材27cが設けられる。このサーバ上下動部材27cは、前記フレーム26前端部に回動自在に取り付けられた、上下方向に沿う軸のネジ棒27c1と、前記サーバフレーム27bに固定された、該ネジ棒27c1の外周に咬み合って該ネジ棒27c1の回転により上下動する被動ネジ部材27c2からなる。また、前記コンベア上下駆動部14cと前記サーバ上下動部材27cとの下方かつほぼ中間位置には、前記コンベア上下駆動部14cと前記サーバ上下動部材27cに駆動力を与える上下駆動モータ48が設けられており、上下駆動モータ48の軸に固定されたプーリ48aと前記の各ネジ棒14c1及び27c1の下端部に固定されたプーリ14c4及び27c3との間には、それぞれタイミングベルト50a及び50bが張り渡されている。したがって、前記上下駆動モータ48が回転することにより、各ネジ棒14c1及び27c1が回転して各被動ネジ部材14c2及び27c2を介してシリンダ部材14c3及びサーバフレーム27bが上下動するようになっている。また、シリンダ部材14c3は、前記上下駆動モータ48の作動とは独立して作動するようになっている。

【0029】図1に示すように前記前方撮像機群22は、ベルトコンベア装置14のコンベアベルト往路16aの前端部をその視野内に捕らえるようにフレーム26の上部構造に配設される。また、後方撮像機群24は、下方を向き、前記コンベアベルト空間形成手段18の開口部35に臨む位置に、前後動部材52を介して前後動可能にフレーム26に配設される。後方撮像機群24には、帯状部材10の後端の標識線を検出するための標識線撮像機24aと、帯状部材10の後端部の左右側端形状を検出するための後端側部検出撮像機24bとがある。前記前後動部材52は、前記標識線撮像機24a及び後端側部検出撮像機24bの前後動方向に沿う軸のネジ棒52aと、該ネジ棒52aの外周に咬み合う被動ネ

ジ部材52bと、該被動ネジ部材52bに吊り下げられるように固定されて、前記標識線撮像機24a及び後端側部検出撮像機24bをとともに取り付けるための取り付け板52cとを有してなる。前記ネジ棒52aは軸方向両端部がフレーム26により回動自在に支持されており、その一端部に駆動用のモータ52dが連結される。

【0030】前記ベルトコンベア装置の把持手段60の詳細な構成を図10及び図11に示す。前記ベルトコンベア装置には、図10に示すように（図1にては省略している）、フレーム26の上部構造には、コンベアベルト往路16a上に臨んで、帯状部材の搬送方向に沿ってビーム62が延設かつ支持されており、このビーム62の下面には、該ビーム62に沿って延びるレール63が配設されている。このレール63には、把持手段60が可動フレーム64を介して支持され、これにより、把持手段60が帯状部材10の上方で支持され、かつ、その搬送方向に沿って移動するようになっている。

【0031】すなわち、可動フレーム64は、図示しない送り手段によりレール63をその長手方向に移動可能になっていて、かつ、図示しない昇降手段により把持手段60を上下動可能になっている。また、図11に示すように、可動フレーム64には、前記レール63に摺動可能に係合するスライドベアリング65が配設されている。前記可動フレーム64の長手方向両端部には、逆ねじが形成された一对の水平なねじ軸66がそれぞれ回転可能に支持され、これらねじ軸66はビーム62に対して直角に延びている。図11において符号67は、前記ねじ軸66にそれぞれ螺合するねじブロック67であり、これらのねじブロック67は可動フレーム64に取り付けられた一对のレール68にそれぞれ摺動可能に係合している。また、69は可動フレーム64の両端部にそれぞれ固定されたモータであり、これらモータ69の回転駆動力はプーリ70、71及びベルト72を介して前記ねじ軸66に伝達される。そして、前記モータ69が作動して各ねじ軸66が逆方向に回転すると、ねじブロック67同士は同一方向に等距離だけ移動する。前述したネジ軸66、ねじブロック67、レール68、モータ69、プーリ70、71、ベルト72は全体として変位手段73を構成し、これらの変位手段73は後述する把持具61によって、把持された帯状部材10を幅方向に変位させる。なお、前記モータ69が作動してねじ軸66が同一方向に回転した場合には、ねじブロック67同士は逆方向に等距離だけ移動して互いに接近離隔する。

【0032】前記ねじブロック67にはそれぞれ可動ブロック75が固定され、これらの可動ブロック75の下部にはねじ軸66と平行なシリンダ76が取り付けられている。各シリンダ76のピストンロッド77の先端には下爪78が固定され、これらの下爪78は帯状部材10の幅方向一側端部の下面及び幅方向他側端部の下面に

11

それぞれ係合することができる。そして、各下爪78は、シリンダ76のピストンロッド77が突出したり引っ込んだりすることにより、帯状部材10の幅方向に移動し互いに接近離隔する。79は各シリンダ76のロッド側に固定されたブロックであり、各ブロック79には、垂直なシリンダ80が固定されている。これらの各シリンダ80のピストンロッド81の先端には下爪78と対をなす上爪82が回動可能に連結され、これらの上爪82はシリンダ80の作動により対応する下爪78に対して接近離隔し、帯状部材10の先端部の一側端部及び他端側端部を下爪78とともに両側から把持する。なお、83は上爪82の回転止めを行うストッパーである。前述した下爪78、上爪82は全体として、帯状部材10の先端が成型ドラム12に圧着されたとき、該帯状部材10の後端部を把持する把持具61を構成する。また、前記可動フレーム64の中央部にはシリンダ84のヘッド側が回動可能に連結され、このシリンダ84のピストンロッド85の先端には圧着部材86が回動可能に連結されている。この圧着部材86は前記上爪82間に位置し、また、シリンダ84のピストンロッド85が突出したとき帯状部材10を成型ドラムに12に押し付け圧着する。なお、実施例の帯状部材供給装置の電気的な制御装置は、シーケンスコントローラやマイクロコンピュータ等から構成され、それらは周知のもののためその説明及び図示は省略する。

【0033】次に、実施例の帯状部材供給装置の作動を説明する。図12は前記帯状部材供給装置のベルトコンベア装置14の作動説明図である。図12(a)に示すように、帯状部材10がベルトコンベア装置14に搬入されると、該ベルトコンベア装置14は、まず、コンベアベルト16a上に帯状部材10を載置し、コンベアベルト16を循環させて該帯状部材10の図中矢印c方向への搬送を開始する。その後、部材検出器40が帯状部材10を検出したならば、検出後所定時間が経過した後に、図12の(b)に示すように、帯状部材10の搬送を停止する。この所定時間は、タイマに設定されており、停止時に帯状部材10の先端部が前方撮像機群22の視野内に入るような適宜の時間に設定される。これにより、長さの異なる種々の帯状部材10を搬送した場合にも、各々の帯状部材10の先端部を該視野内のほぼ同一地点に位置させることができる。したがって、帯状部材10の長さが異なっても、各帯状部材10先端部の測定に際しての測定環境に変化が生じない。

【0034】また、コンベアベルト空間形成手段18及び後方撮像機群24は、ベルトコンベア装置14に帯状部材10が搬入される前または後に、帯状部材10サイズの基準長さに応じた位置に移動する。この場合に、あらかじめ前記基準長さが分からないときには、帯状部材10の搬送停止後に前記コンベアベルト空間形成手段18及び後方撮像機群24を帯状部材10の長さに応じた

12

位置に移動させて、帯状部材10の後端部を後端部検出撮像機20及び後方撮像機群24の視野内に入れることができる。したがって、帯状部材10の長さが異なっても、各帯状部材10後端部の測定に際しての測定環境に変化が生じない。なお、コンベアベルト空間形成手段18及び後方撮像機群24は、それらの移動を同期して制御する必要はない。また、それら位置は正確に知ることが可能になっている。

【0035】また、ベルトコンベア装置14に帯状部材10の搬入されて停止したときに、帯状部材10の幅方向位置については、前方、後方撮像機群22、24及び後端部検出撮像機20の視野内に帯状部材10の撮像目的部分が入るように、センタリングされていなければならない。そこで、ベルトコンベア装置14にあらかじめセンタリングした帯状部材10を搬入するか、あるいは、帯状部材10を搬入中にセンタリングする。

【0036】以上のようにして、検出条件が整った後に帯状部材10の各部の検出を行う。この場合、図6ないし図8に示すようにベルトコンベア装置14の前端部には、乳白色の第2の参照板44が配設されているため、帯状部材10の前端部と第2の参照板44の輝度差が大きくなり、白・黒のコントラストが明確になる。したがって、前方撮像機群22で得られた画像により帯状部材10の前端部の中央部分のエッジや側端部分等が明確に検出でき、例えば、帯状部材10幅方向側部に縮みが生じた際に適切に対応できる。また、図6に示したようにローラコンベア34の前端部がベルトコンベア装置14の前端部より前方に出ている場合においてはローラコンベア34の前端部に第2の空間46が形成されているため、ローラコンベア34が邪魔にならずに帯状部材10の前端部中央部分を検出できる。またこの場合、帯状部材10の前端部は下方に垂れ下がりや、しわが生じることがないため、タイヤの品質維持ができる。もちろん垂れ下がりの心配のない場合には、図7に示すように、ローラコンベア34の前端部をベルトコンベア装置14の前端部より前方に出す必要はない。

【0037】また、コンベアベルト空間形成手段18の上部開口部35には、図3または図4に示すように、乳白色の参照板36が配設されているため、帯状部材10の後端部が、前記前端部と同様に、第一の参照板36との輝度差が大きくなり、後方側部検出撮像機24bで得られた画像により、帯状部材10の後端部の側端部分が明確に検出でき、該側端部に生じた縮みに適切に対応できる。また、第2の照明器38で帯状部材10の後端部表面を照明しているため、標識線撮像機24aで得られる画像により帯状部材10の表面の標識線を検出できる。

【0038】また、前記図5に示すように、帯状部材10の後端部の下面10aと後端面を10bとをそれぞれ独立した方向から二つの照明機18fで参照光を照射す

13

るため、帯状部材10の下面10aと後端面10bとの間の稜線を浮き出させて明確化できる。したがって、後端部検出撮像機20の撮像画像は稜線の明確に示されたものとなり、それにより、従来できなかった後端部の稜線を精度よく検出できる。また、図4に示したようにローラコンベア34のコンベアベルト空間形成手段18の近傍の部分には空間39が形成されているため、ローラコンベア34が邪魔にならずに帯状部材10の後端部の稜線の中央部を検出できる。以上のように、帯状部材10の前端部（特にエッジ）及び後端部（特に稜線）をあらかじめ距離の分かっている前方撮像機群22と後端部検出機20により検出できるため帯状部材10の正確な長さが分かる。

【0039】次に、前記サーバコンベア27とコンベア上下駆動部14cの作動を説明する。サーバコンベア27は、成型ドラム12が大きさの異なるものに替わる場合に、上下駆動モータ48を回転させサーバコンベア27を上下動させる。これにより、帯状部材10を成型ドラムの周面の目的位置に導く。また、上下駆動モータ48の回転は、コンベア上下駆動部14cの被動ネジ部材14c2及びシリンダ部材14c3を上昇あるいは下降させる。この際、シリンダ部材14c3には、圧力が印加されていないため、そのシリンダのみ上昇し、シリンダロッドはローラコンベア34及びベルトコンベア装置14の重みにより、該シリンダ内に後退して行く。したがって、この状態では、サーバコンベア27の搬送面レベルとベルトコンベア装置14の搬送面レベルは一致していない。その後、シリンダ部材14c3に圧力が印加されるとシリンダロッドは上昇してローラコンベア34及びベルトコンベア装置14の前端の搬送レベルはサーバコンベア27の搬送レベルと一致する。このように各コンベア27と34、14の搬送レベルの一致した状態で帯状部材10を成型ドラムに向けて搬送する。なお、帯状部材10の前端と後端の検出においては、同一測定環境下で行うことが望ましいため、その検出時には、前記シリンダ部材14c3には圧力を印加せずにローラコンベア34及びベルトコンベア装置14を最も低い位置にした状態で帯状部材10の前端部と後端部の各検出を行い、その検出結果から帯状部材10の長さを検出する。その検出後に前記シリンダ部材14c3に圧力を印加してローラコンベア34及びベルトコンベア装置14の各前端部を上昇させる。

【0040】以上のように帯状部材10の長さが検出されたならば、この検出情報に応じて図示されない図10、図11に示した把持手段60の把持具61で帯状部材10の後端部あるいは前端部及び後端部を把持する。この場合、帯状部材10後端部がコンベアベルト16で囲まれる空間上にくるように帯状部材10の長さに応じてコンベアベルト空間形成部18の搬送方向位置を予めあるいは帯状部材10搬送後に調整する。また、帯状部

14

材10の後端部の把持において前記空間形成部18によりコンベアベルトの往路16aの途中に空間（開口部35）が形成されているため、把持手段60の把持具61（上爪82および下爪78等）を何の支障もなく搬送経路上の帯状部材10の後端部の側方から挿入しかつ掴むことができる。しかも、その開口部35の参照板36の取り付け位置は、コンベアベルト往路16aのレベルよりやや下側のレベルに位置するため、この参照板36も支障になることなく、把持具61で帯状部材10の後端部をスムーズに掴むことができる。そして、帯状部材10の前端部を図示しない圧着手段で圧着する等してその前端部を成型ドラム12に貼り付け、その後、該帯状部材10を成型ドラム12に巻き付けながら把持具61で把持している帯状部材10後端部を後方に引いたり前方に出したりして、巻つけの調整を行う。つまり、短すぎる場合は、帯状部材10を引っ張り、長すぎる場合は、帯状部材10は縮める。

【0041】なお、前記実施例では帯状部材供給装置に用いられたベルトコンベア装置に本発明を適用した場合を例示したが本発明の実施範囲はこれに限定されないことはもちろんである。例えばコンベアベルト空間形成手段の各ローラの配置や個数は前記実施例に限定されず、例えば、ローラを上方に2つ、下方に1つ配置するように構成したり、中段に1つ増やしたりすることができる。

【0042】

【発明の効果】以上説明した通り、本発明によれば、ベルトコンベアの往路上にベルトコンベアを下方にへこませて空間を形成するため、把持具による帯状対象部の後端部の把持がやりやすくなる。また、コンベア帯の往路上に搬送される搬送対象物を下方から検出することができるようになる。したがって、従来できなかった搬送対象物の正確な検出を可能とすると共に搬送対象物の後端部把持がやりやすくなる。また、搬送対象物を帯状部材とし、その後端を撮像して検出できるようにすれば、帯状部材の後端切断面が下方に向いていても、帯状部材後端を正確に検出することができ、さらには、精度良く帯状部材の長さを検出することができる。したがって、帯状部材の成型ドラムに貼り付ける作業が滞ることがない。また、対象物検出手段を、搬送方向に沿って移動が可能なものにすれば、長さの異なる帯状部材を混在して搬送する場合に、搬送前あるいは搬送中に対象物検出手段の位置を帯状部材の長さに適合した位置に移動させることができたため、各帯状部材の長さを正確に測定することができる。

【図面の簡単な説明】

【図1】本発明の実施例に係る帯状部材供給装置の全体構成図である。

【図2】図1のII-II線視図である。

【図3】図1のIII-III線断面図である。

15

16

【図4】図1のx方向視図である。

【図5】図4のV-V線断面視図であって、コンベア空間形成手段の構成例説明図である。

【図6】ローラコンベア及びベルトコンベア装置の前端部構成例の説明図である。

【図7】ローラコンベア及びベルトコンベア装置の前端部構成例の他の説明図である。

【図8】ローラコンベア及びベルトコンベア装置の前端部構成例の説明図である。

【図9】サーバコンベアの構成説明図である。

【図10】把持手段の取り付け状態説明図である。

【図11】把持手段の詳細構成を説明する一部断面正面図である。

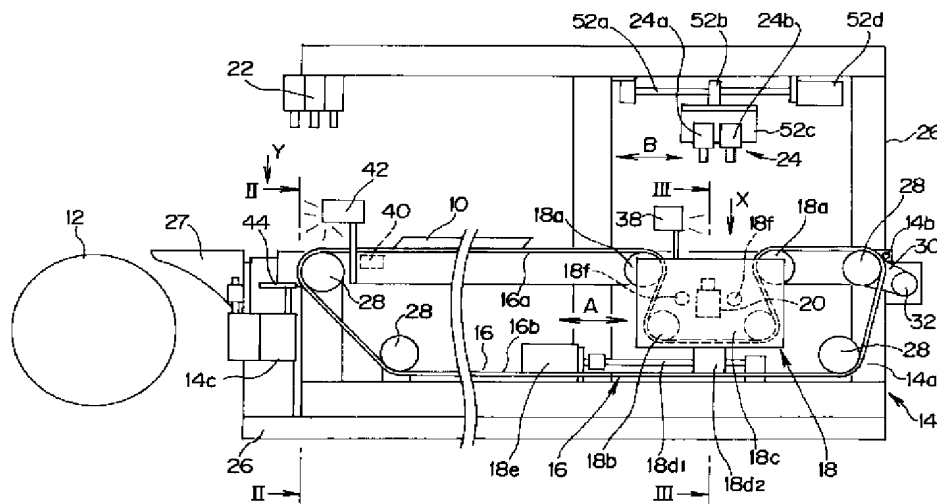
【図12】ベルトコンベア装置の作動説明図であり、(a)は搬送時 (b)は停止時の状態を示す。

【図13】従来のベルトコンベア装置の構成説明図である。

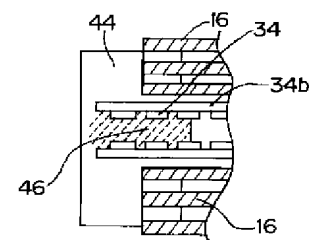
【符号の説明】

- 10 带状部材
- 12 成型ドラム
- 14 ベルトコンベア装置
- 16 コンベアベルト
- 16a 往路
- 16b 復路
- 18 コンベアベルト空間形成手段
- 18a 上部ローラ
- 18b 下部ローラ
- 18c ボックス部材
- 18d ボックス移動部材
- 18e 駆動モータ
- 18f 第1の照明器
- 20 後端部検出撮像機
- 35 開口部
- 60 把持手段
- 61 把持具

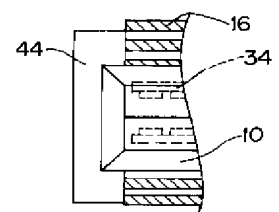
【図1】



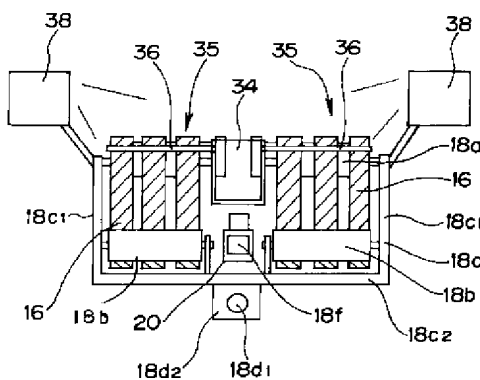
【図6】



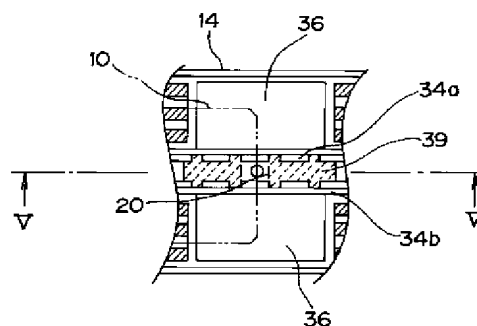
【図7】



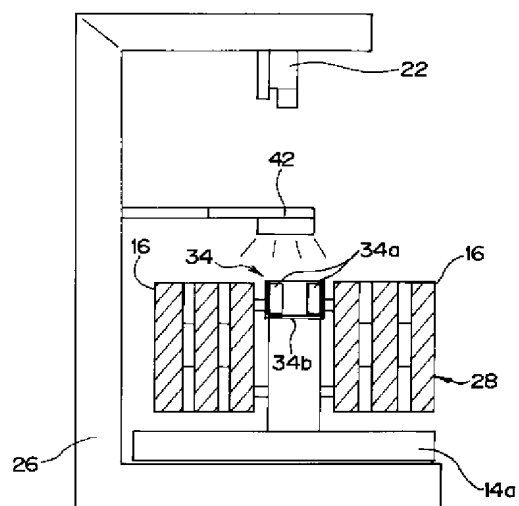
【図3】



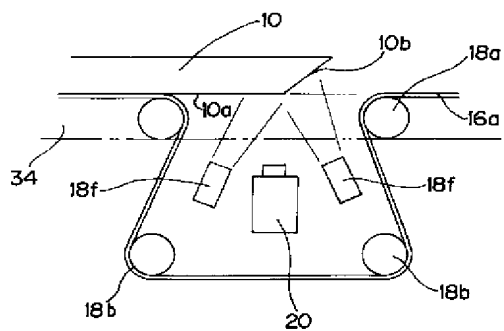
【図4】



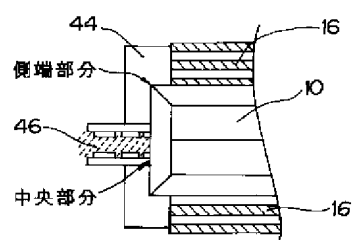
【図2】



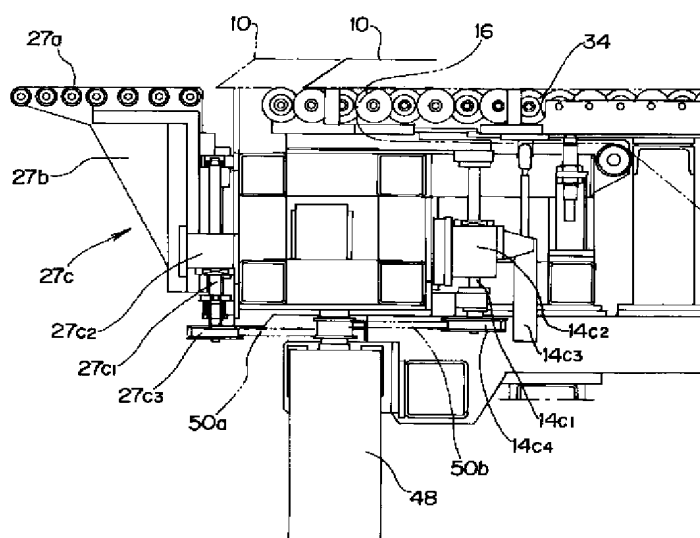
【図5】



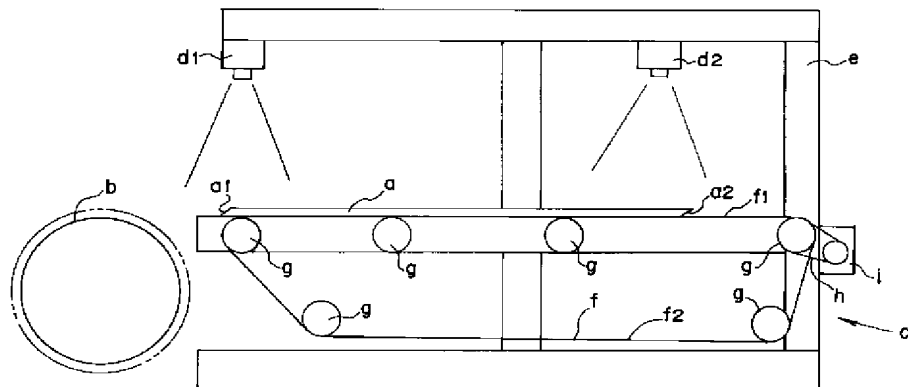
【図8】



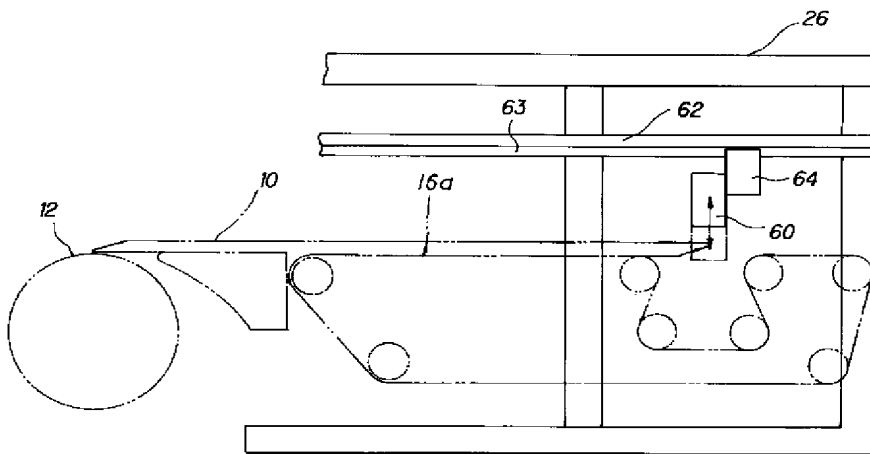
【図9】



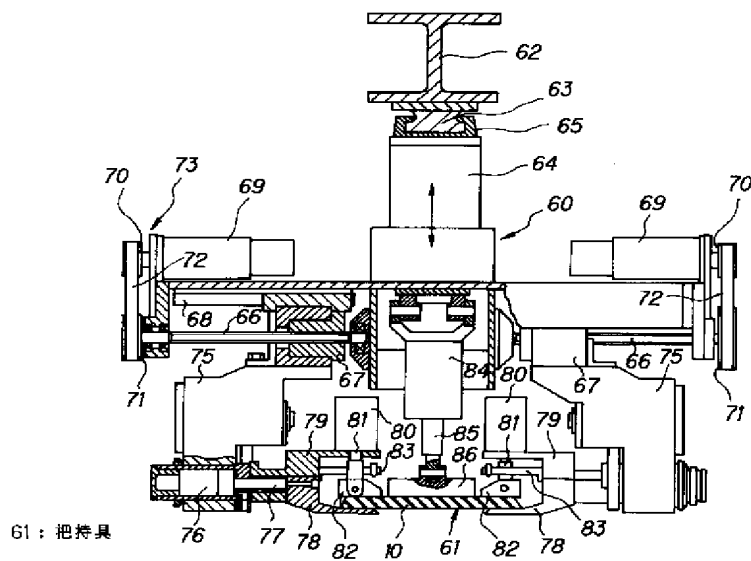
【図13】



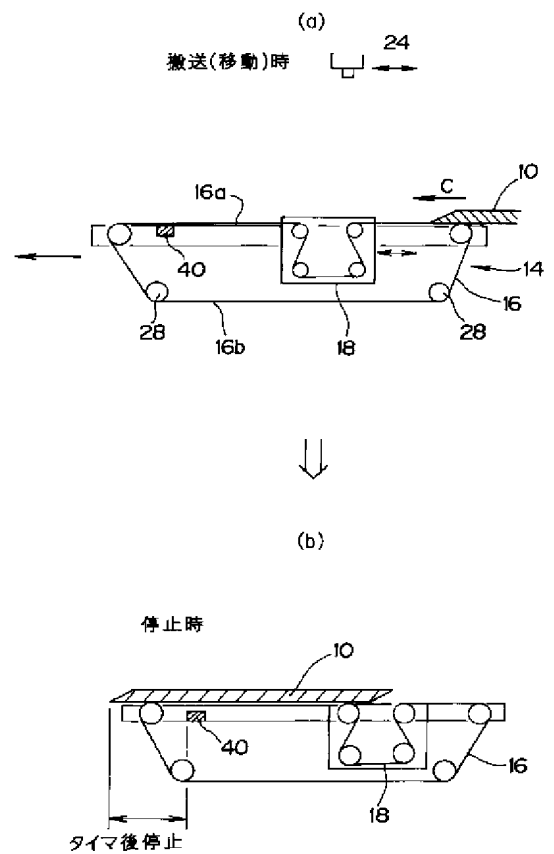
【図10】



【図11】



【図12】



DERWENT-ACC-NO: 1995-057257

DERWENT-WEEK: 199508

COPYRIGHT 2009 DERWENT INFORMATION LTD

TITLE: Conveyor to facilitate grasping of object rear end having space formed by recessing conveyor belt downward and bridge-like roller conveyor before and after space, to facilitate grasping of object rear end

INVENTOR: ISHIWATARI T; NAGANO

PATENT-ASSIGNEE: BRIDGESTONE CORP[BRID]

PRIORITY-DATA: 1993JP-076734 (April 2, 1993)

PATENT-FAMILY:

PUB-NO	PUB-DATE	LANGUAGE
JP 06336328 A	December 6, 1994	JA

APPLICATION-DATA:

PUB-NO	APPL-DESCRIPTOR	APPL-NO	APPL-DATE
JP 06336328A	N/A	1993JP-285000	November 15, 1993

INT-CL-CURRENT:

TYPE	IPC DATE
CIPP	B29D30/30 20060101
CIPS	B29D30/44 20060101
CIPS	B65G15/28 20060101
CIPS	B65G43/08 20060101

ABSTRACTED-PUB-NO: JP 06336328 A

BASIC-ABSTRACT:

Bandlike object transfer equipment consists of roller conveyor in the centre and at least a pair of belt conveyors located at the left and right of the roller conveyor. The belt conveyor is made up of the forward path which transfers objects to the destination and the return path. In the course of the forward path, the belt conveyor is recessed downward to form a space enclosing the belt conveyor, and before and after the space, the roller conveyor extends like a bridge.

Also claimed is case where object detector is provided with the space forming rollers which forms a space enclosed by the conveyor belt by recessing the conveyor belt downward. The object detecting camera which is installed in the formed space detects the object placed on the forward path.

ADVANTAGE - This equipment facilitates grasping of the rear end of a bandlike object, and allows the object conveyed on the forward path to be detected.

CHOSEN-DRAWING: Dwg.1/12

TITLE-TERMS: CONVEYOR FACILITATE GRASP OBJECT REAR END SPACE
FORMING RECESS BELT DOWN BRIDGE ROLL AFTER

DERWENT-CLASS: A32 A88 Q35

CPI-CODES: A09-D01; A11-A; A11-B17; A12-T01A;

ENHANCED-POLYMER-INDEXING: Polymer Index [1.1] 017 ; H0124*R;

Polymer Index [1.2] 017 ; ND05; J9999
J2915*R; K9416; N9999 N6348 N6337;
N9999 N7261; N9999 N6611*R; Q9999
Q9256*R Q9212;

SECONDARY-ACC-NO:

CPI Secondary Accession Numbers: 1995-025813

Non-CPI Secondary Accession Numbers: 1995-045320

Disclaimer:

This English translation is produced by machine translation and may contain errors. The JPO, the INPIT, and those who drafted this document in the original language are not responsible for the result of the translation.

Notes:

1. Untranslatable words are replaced with asterisks (***).
2. Texts in the figures are not translated and shown as it is.

Translated: 00:27:02 JST 03/26/2009

Dictionary: Last updated 03/23/2009 / Priority: 1. Manufacturing/Quality / 2. Technical term / 3. JIS (Japan Industrial Standards term)

FULL CONTENTS

[Claim(s)]

[Claim 1]A central part roller conveyor.

At least a pair of conveyor belts located in right and left of this roller conveyor.

An outward trip which is conveyor conveying equipment provided with the above, and the above-mentioned conveyor belt drives a subject and is conveyed to the purpose position, And it consists of a return trip which returns after conveyance, among these space which dented a conveyor belt below in the middle of an outward trip, and was surrounded on this conveyor belt is formed, and, as for the conveyance direction order of this space, a roller conveyor is prolonged in the shape of a bridge.

[Claim 2]Conveyor conveying equipment provided with a conveyor belt which consists of an outward trip which conveys a conveyance subject characterized by comprising the following to the purpose position, and a return trip which returns after conveyance.

A conveyor belt space formation means to form space which dents a conveyor belt below and is surrounded with this conveyor belt in the middle of an outward trip.

A subject detection means to detect a conveyance subject which was provided in formed space and was laid on an outward trip.

[Claim 3]A conveyance subject sensing device of conveyor conveying equipment, wherein a conveyance subject is a strip member in Claim 1 and a subject detection means is what picturizes and detects the back end of a conveyance subject.

[Claim 4]A conveyance subject sensing device of conveyor conveying equipment having a means for [of a conveyor belt space formation means or a subject detection means] moving either along the conveyance direction at least in Claim 1 or 2.

[Detailed Description of the Invention]

[0001]

[Industrial Application] This invention relates to the conveyance subject sensing device of conveyor conveying equipment and conveyor conveying equipment, It is related with the conveyance subject sensing device of conveyor conveying equipment and conveyor conveying equipment are conveyor conveying equipment provided with the conveyor belt which consists of an outward trip which conveys a conveyance subject to the purpose position in detail, and a return trip which returns after conveyance, and suitable to use for a strip member feed unit.

[0002]

[Description of the Prior Art] Generally, in the molding process of tires (pneumatic tire etc.), a strip member, for example, tread rubber, is stuck on a molding drum, and the raw tire is molded. Since it is necessary to turn said strip member to a molding drum, and to supply it on the occasion of this molding, the strip member feed unit is used. This strip member feed unit has a means to convey said strip member to that supply direction.

One of the transportation means of this has a belt conveyor device of the well-known which conveys a strip member with a conveyer belt (equivalent to a conveyor belt).

[0003] The strip member feed unit which has this kind of belt conveyor device has composition shown in the former, for example, drawing 13. Belt conveyor device c instituted by meeting almost horizontally for the strip member feed unit of drawing 13 to mainly convey the strip member a to the purpose position of the circumference top of the molding drum b thru/or the neighborhood, The image pick-up machines d1 for picturizing a tip part or a rear end part of the strip member a, etc. from the upper part of this belt conveyor device c, such as a camera for industry, and d2, It has the frame e which supports and fixes each part of a strip member feed unit, such as supporting belt conveyor device c by a substructure, and supporting the image pick-up machine d1 and d2 by upper structure. The conveyer belt f which consists of the outward trip f1 which said belt conveyor device c lays the strip member a, and is conveyed to the purpose position conveyance on the street, and the return trip f2 which returns after conveyance. It is supported by the frame e, enabling free rotation, and it has the belt driving motor i which gives driving force to the belt pulley (roller) g which supports and guides said conveyer belt f, and said conveyer belt f via the timing belt h, and is constituted.

[0004] The strip member feed unit of drawing 13 is faced supplying the strip member a to the molding drum b, and first, where the strip member a is laid on the outward trip f1 of the conveyer belt f, it is conveyed in the direction (the conveyance direction) of molding drum b. Subsequently, the sensor which is not illustrated detects the tip of the strip member a, and based on the detection signal of this sensor, when the tip part of this strip member a moves to the purpose position, conveyance is stopped. Then, based on the image pick-up machine d1,

the image pick-up picture information of d2, and each image pick-up machine d1 known beforehand and the interval of d2, the length of the strip member a is measured and it asks for the excess and deficiency to the setting length of the strip member a from the test result of this length. Subsequently, attachment by the molding drum of the strip member a is performed so that said excess and deficiency may become zero at the time of the end of attachment (for example, refer to JP,H4-347630,A). This gazette has disclosed the art of compensating a part for said excess and deficiency, and sticking the strip member a by grasping the rear end part of said strip member a by a grasping nail, and a grasping nail's pulling the strip member a, or pushing and contracting, and extending the strip member a.

[0005]As the strip member a used for the above tire molding was shown in drawing 13, each end faces a1 and a2 of the tip part and a rear end part should incline so that the upper surface side of a strip member might become backward. At the time of the attachment in the molding drum b, it is requested that each of this end face a1 and a2 comrades should be stuck without a crevice. Thus, in order to make it stick, it must stick so that the edge (tip by the side of the strip member a undersurface) of the lower part of the tip part end face a1 and the ridgeline (boundary this end face a2 and under a strip member) of the lower part of the rear end part end face a2 may be in agreement. Therefore, it is necessary to detect said edge of the strip member a, and each exact position of a ridgeline before molding. If an exact position is detected, it is necessary by a grasping nail to grasp the strip member a so that a position may not shift.

[0006]

[Problem to be solved by the invention]However, in said conventional strip member feed unit, said ridgeline of the strip member a cannot be detected correctly, but there is a problem of being hard to stick a strip member with sufficient accuracy. When grasping the rear end part of the strip member a by a grasping nail and the rear end part is on the conveyor, there is a problem that it is difficult to enter so that the position of the strip member a may not shift, when putting a lower claw into the lower part of the strip member a. That is, said each image pick-up machine d1 and d2 are faced above the strip member a, and they picturize and detect the tip part and rear end part of this strip member a. For this reason, since this strip member a tip part end face a1 has turned to the slanting upper part, a problem does not produce it easily about edge detection, but since said strip member a rear end part end face a2 has turned to the slanting lower part, it cannot perform detection of said ridgeline. When said not only ridgeline but the surface state of said rear end part end face a2 could be detected, it could become information useful to attachment, but such information was not acquired in the strip member feed unit provided with the conventional belt conveyor device.

[0007]Since it is difficult in the conventional strip member feed unit to set an image pick-up machine to the detection part corresponding to the length of each strip member quickly in the strip member feed unit concerned when one strip member of various length after another must

be conveyed, There was a problem that it was difficult to measure the length of each strip member member, and there was a possibility that the work which sticks a strip member, for example, tread rubber, on a molding drum may be overdue.

[0008]In the common belt conveyor device, detection of the conveyance subject is performed from the upper part of this conveyance subject, or the side. Therefore, detection of the back end which was not made but turned to the undersurface and the lower part of the conveyance subject was impossible for the detection from the lower part of this conveyance subject. If the conveyance subject was detected from the upper part, the various equipment for having a detection means above conveyor conveying equipment was required, and there were equipment being large-sized and a problem of being easy to complicate.

[0009]This invention is made so that it may cancel said conventional problem, and the purpose is to provide the conveyor conveying equipment which make easy to do rear end part grasp of the band-like subject of a conveyance subject. Enable detection from the lower part of a conveyance subject, for example, a strip member, and highly precise detection of a conveyance subject is enabled, and it is providing the conveyance subject sensing device of the conveyor conveying equipment which make easy to do rear end part grasp of a conveyance subject. It is providing the conveyance subject sensing device of the conveyor conveying equipment which can attain facilitation and speeding up of the sticking work of a strip member. It is providing the conveyance subject sensing device of conveyor conveying equipment detectable with sufficient accuracy corresponding to the length of a conveyance subject.

[0010]

[Means for solving problem]This invention has the next composition in order to attain said purpose. . Namely, the invention of Claim 1 consists of a central part roller conveyor and at least a pair of conveyor belts located in the right and left of this roller conveyor. The outward trip which is a device which conveys a band-like subject, and the above-mentioned conveyor belt drives a subject and is conveyed to the purpose position, And it consists of a return trip which returns after conveyance, among these the space which dented the conveyor belt below in the middle of the outward trip, and was surrounded on this conveyor belt is formed, and it is conveyor conveying equipment, wherein a roller conveyor is prolonged in the shape of a bridge before and behind the conveyance direction of this space.

[0011]In conveyor conveying equipment provided with the conveyor belt which consists of an outward trip on which the invention of Claim 2 conveys a conveyance subject to the purpose position, and a return trip which returns after conveyance, A conveyor belt space formation means to form the space which dents a conveyor belt below and is surrounded with this conveyor belt in the middle of an outward trip, It is a conveyance subject sensing device of the conveyor conveying equipment having been provided in the formed space and having a subject detection means to detect the conveyance subject laid on the outward trip.

[0012]The conveyance subject of the invention of Claim 3 is a strip member, and a subject detection means constitutes the conveyance subject sensing device of the conveyor conveying equipment characterized by being what picturizes and detects the back end of a conveyance subject.

[0013]The invention of Claim 4 constitutes the conveyance subject sensing device of conveyor conveying equipment provided with the means for [of a conveyor belt space formation means or a subject detection means] moving either along the conveyance direction at least.

[0014]

[Function]In the invention of Claim 1, the space surrounded on the conveyor belt in the middle of the outward trip is formed, and, as for the conveyance direction order of this space, a roller conveyor is prolonged in the shape of a bridge.

Therefore, a holding means is put into the space, without being interfered by the conveyor belt, and a band-like subject can be grasped, therefore it becomes easy to do the grasp of the rear end part of the band-like subject for conveyance.

In the invention of Claim 2, the space which dents a conveyor belt below and is surrounded with this conveyor belt in the middle of an outward trip is formed, and it has a subject detection means in the formed space.

Therefore, the conveyance subject conveyed on the outward trip of a conveyor belt can be detected now from a lower part.

Therefore, it comes to be able to perform exact detection of the conveyance subject which was not made conventionally. A holding means is put into the space, without being interfered by the conveyor belt, and a band-like subject can be grasped, therefore it becomes easy to do the grasp of the rear end part of the band-like subject for conveyance.

[0015]If a conveyance subject is used as a strip member, the back end is picturized like the invention of Claim 3 and it enables it to detect, even if the back end cutting plane of the strip member is below suitable, the strip member back end can be detected correctly and the length of a strip member can be detected with still more sufficient accuracy. Therefore, the work stuck on the molding drum of a strip member is not overdue. If a subject detection means is made into what can move along the conveyance direction like the invention of Claim 4, When it is intermingled and conveys the strip member from which length differs, the position which suited the length of the strip member can be made to be able to move the position of a subject detection means before conveyance or during conveyance, it can accumulate, and the length of each strip member can be measured correctly.

[0016]

[Working example]With reference to Drawings, the work example of this invention is described in detail below. This work example is the strip member feed unit which adopted the conveyance subject sensing device of the conveyor conveying equipment concerning this invention. Drawing 1 shows the side composition of the strip member feed unit of a work

example, and drawing 2 thru/or drawing 12 show each part composition or the operation explanatory view of said strip member feed unit. in addition -- in the following explanation -- "-- front" -- "-- in the "right" and the direction of the "left", back" includes [the point and the back] the conveyance direction along the conveyance direction -- being mostly suitable in the conveyance direction in the level surface -- the right and the left -- "-- upper" and "lower] express a top and the bottom along with the perpendicular direction.

[0017]As shown in drawing 1, [said strip member feed unit] The belt conveyor device 14 instituted by mainly meeting for conveying the strip members 10, such as tread rubber of a tire, to the purpose position near the molding drum 12 almost horizontally, In the middle of the outward trip 16a of this belt conveyor device 14, and the conveyer belt space formation part 18 which forms the space which was established in the rear side, and which dents the conveyer belt 16 below and is surrounded with this conveyer belt 16, The rear end part detection image pick-up machine 20 which picturizes the rear end part of the strip member 10 which was provided in the formed space and was laid on the conveyer belt outward trip 16a from a lower part for detection, The image pick-up machine groups 22 and 24 for being allocated above the front part of said belt conveyor device 14, or the rear, and picturizing the sign line of the tip part of the strip member 10, and a rear end part, etc. from the upper part, such as a camera for industry, The device frame 26 which supports and fixes each part of a strip member feed unit, such as supporting the belt conveyor device 14 by a substructure, and supporting the image pick-up machine groups 22 and 24 by upper structure, It has the server conveyor 27 for leading the conveyed strip member 10 to the upper part of the peripheral surface of the molding drum 12 formed between the belt conveyor device 14 and the molding drum 12.

[0018]The conveyor frame 14a with which said belt conveyor device 14 mainly supports and fixes each part, The conveyor belt 16 which consists of the outward trip 16a which lays the strip member 10 and is conveyed to the purpose position conveyance on the street, and the return trip 16b which returns after conveyance, The belt pulley (roller) 28 which is supported by said conveyor frame 14a, enabling free rotation, contacts said conveyer belt 16 rotationally, and supports and guides said conveyer belt 16, It has the belt driving motor 32 which gives driving force to said conveyer belt 16 via the timing belt 30, and is constituted. In drawing 1, 14b is a rotation center axis of the belt conveyor device 14 in which the direction of an axis meets a horizontal direction and which was provided in the rear end part of said conveyor frame 14a. 14c is a conveyor up-and-down actuator for rotating said belt conveyor device 14 over the plane which includes the up-and-down direction centering on said central axis 14b, and moving the conveyance direction tip position up and down. The details of this conveyor up-and-down actuator 14c are mentioned later.

[0019]Said belt pulley 28 is arranged, as it is arranged by the upper part and the lower part of the belt conveyor device 14 and there is top arrangement under the top arrangement of lower arrangement along said conveyance way. In a work example, although said belt pulley 28 is

allocated in two places, the front end part and rear end part of a conveyor conveyance way, by top arrangement, it can be allocated in a proper part if needed. The lower arrangement of the belt pulley 28 is arranged a little from top arrangement by the direction inner side of order.

[0020]As shown in drawing 2 which is an II-II **** figure of drawing 1, the roller conveyor 34 is allocated in the cross direction center by said belt conveyor device 14. or [that the roller (circular roller) 34a of a double sequence and the shape of many disk type is arranged along the conveyance direction, and this roller conveyor 34 becomes, and is almost the same as the belt conveyor device 14] -- or it is a thing of long length. Each circular roller 34a of the roller conveyor 34 is supported pivotally by the internal surface of the both sides of the roller support member 34b which has the shape of type of KO with the up open conveyance direction right-angled section, and becomes a longitudinal direction from an almost isomorphous section bar, enabling free rotation. The hand of cut corresponds in said conveyance direction, and the top tangent of each of this circular roller 34a corresponds with the top plane of said conveyer belt outward trip 16a. On the whole as a center, the roller conveyor 34 rotates said central axis 14b with the belt conveyor device 14, and a front end part moves up and down.

[0021]To said conveyer belt 16, the belt of a double sequence (two or more) is sent in parallel. In this work example, it is the conveyance direction right and left from every three-row belt of a total of six rows (6) on both sides of said roller conveyor 34.

The number of the belt sequences of the conveyer belt 16 may not be limited to said six rows, but 1 or 2 rows or four rows or more may be sufficient as the number of belt sequences of one side or both sides.

[0022]said conveyer belt space formation part 18 -- the conveyer belt outward trip 16a of said belt conveyor device 14 -- it is mostly allocated in the rear and mainly has the top belt pulley 18a and the lower belt pulley 18b, the box member 18c, and 18 d of box member turning and the drive motor 18e. Said top belt pulley 18a and the lower belt pulley 18b set an interval along the conveyance direction, respectively, and are provided two pieces at a time. Said top belt pulley 18a and the lower belt pulley 18b guide the conveyer belt 16 so that the space which dents the outward trip 16a of the conveyer belt 16 below, and is surrounded with the conveyer belt 16 may be formed. namely, -- said top belt pulley 18a is located in the belt pulley 28, the parallel, and the same plane which guide the outward trip 16a of the conveyer belt 16 -- said lower belt pulley 18b -- the return trip 16b of the conveyer belt 16 -- a little -- the upper part -- and it is located in parallel with the top belt pulley 18a. These top belt pulley 18a and the lower belt pulley 18b form the space surrounded with the conveyer belt 16, when the conveyer belt 16 is winding as follows. That is, see along the conveyance direction, and when it goes, [the conveyer belt 16 of the outward trip 16a] First, can change direction below by the top belt pulley 18a by the side of the conveyance direction rear, and it ranks second, Direction can be changed in the conveyance direction by the lower belt pulley 18b by the side of the conveyance direction rear, further, direction is changeable up by the lower belt pulley 18b by

the side of the conveyance direction front part, it ranks second and direction can be changed in the conveyance direction by the top belt pulley 18a by the side of the conveyance direction front part.

[0023]As shown in drawing 3 of the III-III line sectional view of drawing 1, [said box member 18c] It is allocated in the both sides of the conveyer belt 16 so that the side wall part 18c1 which consists of a rectangular sheet member mostly may become parallel to a plane including the conveyance direction and the up-and-down direction, and the lower part of this both-sides wall 18c1 is connected by the connecting member 18c2 which pierces through between the outward trip 16a of the conveyer belt 16, and the return trip 16b, and is constituted, and the section shape seen from conveyance opens up -- the shape of type of KO is presented mostly. The both ends of the belt pulley axis of the top belt pulley 18a and the lower belt pulley 18b have fitted into the both-sides wall 18c1 of said box member 18c. Since rotation of each belt pulleys 18a and 18b is enabled by the bearing to the belt pulley axis, rotation of each belt pulleys 18a and 18b has been attained to the box member 18c. It is fixed to said connecting member 18c2 so that said rear end part detection image pick-up machine 20 and the 1st illuminator 18f that irradiates the strip member 10 from a lower part may be included by the upper surface in said space.

[0024]As shown in drawing 3, space surrounded with the aforementioned conveyer belt 16 has the opening 35 in which a field surrounded by the conveyer belt 16 wound around each top belt pulley 18a and said side wall part 18c1 carries out an opening to the upper part. However, the 1st reference board 36 that becomes the opening 35, for example from milky acrylics is allocated a little in both sides of the roller conveyor 34 by lower level from a level of the conveyer belt outward trip 16a. It allocates in this way in order to keep the reference board 36 from becoming obstructive, when grasping with the grasping tools 61 of the holding means (robot hand) 60 shown by drawing 10 and drawing 11 which mention the rear later after the strip member 10. The 2nd illuminator 38 that irradiates with light towards said opening 35 from the crosswise outside of said outward trip 16a and the upper part is allocated by the box member 18c.

[0025]Said 18 d of box member turning is allocated in said box member 18c lower part as shown in drawing 1.

18d of threaded rods (screw rod) of the axis which meets in the move direction (that is, it is the same as said conveyance direction) of said box member 18c 1, It is the perimeter of this threaded rod 18d1 from passive-movement 2 and 18d of screw members which carry out forward/backward moving to ***** in the direction of an axis by rotation of this threaded rod 18d1 (it operates in the direction of drawing 1 Nakaya seal A).

One end of the threaded rod 18d1 is connected to the drive motor 18e via coupling, and the other end is rotatably supported by the lower upper surface of the conveyor frame 14a. Two are fixed to the lower part of said box member 18c in said 18d of passive-movement screw

members. Therefore, the box member 18c is movable in the conveyance direction by rotation of the drive motor 18e. Coupling combination is carried out as mentioned above, and also said threaded rod 18d1 and the drive motor 18e may be constituted so that driving force may be transmitted with a belt pulley and a timing belt.

[0026]As shown in drawing 5 of the V-V line cross-sectional-view figure of drawing 4 of X directional vision figure of drawing 1, and drawing 4, the portion corresponding to the view [said rear end part detection image pick-up machine 20 moves the substructure of the roller support member 34b of said roller conveyor 34] of a between is lacking.

It has composition which has the space 39 penetrated in the up-and-down direction.

Thereby, since the view is not interrupted, said rear end part detection image pick-up machine 20 can overlook the upper part of the roller conveyor 34 via said space 39. Therefore, said rear end part detection image pick-up machine 20 can picturize the rear end part of the strip member 10 conveyed on this roller conveyor 34. The 1st two illuminator 18f is allocated along the conveyance direction, one of them irradiates with the undersurface (10a shows by drawing 5) of the strip member 10, and other one irradiates with the rear end face (10b shows by drawing 5) of the strip member 10. By such irradiation, the ridgeline between the undersurface of the strip member 10 and a rear end face can be made to be able to come up, and it can clarify.

[0027]As shown in drawing 1, near the front end part of the outward trip 16a of said belt conveyor device 14, the member detector 40 which detects a front end part of the strip member 10 conveyed is allocated. Ahead, the 3rd illuminator 42 of this member detector 40 that irradiates with a front end part of said belt conveyor device 14 from the upper part a little is allocated. As shown in drawing 6 or drawing 7 which is Y directional vision figure of drawing 1, arrange the roller conveyor 34 so that the front end may be mostly in agreement with the front end of the conveyer belt 16, or, Or it can arrange so that the front end of the roller conveyor 34 may become ahead from the front end of the conveyer belt 16. The 2nd reference board 44 that consists of milky acrylics, for example is allocated by the lower part of a front end part of said belt conveyor device 14 and the roller conveyor 34.

Thereby, monochrome contrast at the time of picturizing the strip member 10 clarifies.

When it has been arranged so that the front end of the roller conveyor 34 may become ahead from the front end of the conveyer belt 16 as shown in drawing 6, [the roller support member 34b of a front end part of the roller conveyor 34] The substructure cuts and lacks, and is and the 2nd space 46 connected up through an inner side of the roller conveyor 34 concerned is formed. Said 2nd reference board 44 faces up via this 2nd space 46. Drawing 8 shows an example of a state which the strip member 10 followed ahead from the conveyer belt 16 front end, and a front end part of the strip member 10 faced on said 2nd reference board 44.

[0028]Detailed composition of the conveyor up-and-down actuator 14c provided in a front end part of said belt conveyor device 14 and the server conveyor 27 is shown in drawing 9. As

shown in drawing 9, [the conveyor up-and-down actuator 14c] The threaded rod (screw rod) 14c1 of an axis which meets in the up-and-down direction attached to said frame 26 front end part toward back enabling free rotation, It consists of the cylinder member 14c3 by which a cylinder was attached to the passive-movement screw member 14c2 which moves up and down by rotation of this threaded rod 14c1 as ***** on the perimeter of this threaded rod 14c1, and the passive-movement screw member 14c2 so that rotation was possible, and link connection of the rod upper part was carried out to the lower part of the roller conveyor 34. The roller 27a of two or more cylindrical shapes with which said server conveyor 27 was arranged by the upper part along the conveyance direction, It has the server frame 27b of shape which retreats and goes as it extends so that this roller 27a may be supported in the upper part, enabling free rotation, and it may see from left and right laterals and the upper part may project ahead, and it goes below. This server frame 27b is slidably attached to a front end part of the frame 26 up and down. The server vertically moving member 27c for moving the server conveyor 27 up and down is formed in a front end part of this frame 26. The threaded rod 27c1 of an axis which meets in the up-and-down direction with which this server vertically moving member 27c was attached to said frame 26 front end part enabling free rotation, It becomes the perimeter of this threaded rod 27c1 fixed to said server frame 27b from the passive-movement screw member 27c2 which moves up and down by rotation of this threaded rod 27c1 as ***** . A lower part and the up-and-down drive motor 48 which gives driving force mostly to said conveyor up-and-down actuator 14c and said server vertically moving member 27c in the mid-position of said conveyor up-and-down actuator 14c and said server vertically moving member 27c are formed.

Between the belt pulley 14c4 fixed to the belt pulley 48a fixed to an axis of the up-and-down drive motor 48, each aforementioned threaded rod 14c1, and a bottom end of 27c1, and 27c3, the timing belts 50a and 50b stretch, and are passed, respectively.

Therefore, when said up-and-down drive motor 48 rotates, each threaded rod 14c1 and 27c1 rotate, and the cylinder member 14c3 and the server frame 27b move up and down via each passive-movement screw member 14c2 and 27c2. The cylinder member 14c3 operates independently with an operation of said up-and-down drive motor 48.

[0029]As shown in drawing 1, said front image pick-up machine group 22 is allocated by the upper structure of the frame 26 so that the front end part of the conveyer belt outward trip 16a of the belt conveyor device 14 may be caught in the view. Via order ***** 52, the back image pick-up machine group 24 is allocated in the position which turns to a lower part and faces it the opening 35 of said conveyer belt space formation means 18 by the frame 26 so that order ** is possible. There are the sign line image pick-up machine 24a for detecting the sign line of the back end of the strip member 10 and the back end flank detection image pick-up machine 24b for detecting the right-and-left side edge shape of the rear end part of the strip member 10 in the back image pick-up machine group 24. The threaded rod 52a of the axis in which said

order ***** 52 meets the said sign line image pick-up machine 24a and back end flank detection image pick-up machine 24b order *****. It is fixed so that it may be hung by the perimeter of this threaded rod 52a at the ***** passive-movement screw member 52b and this passive-movement screw member 52b, and it has the attachment board 52c for attaching both said sign line image pick-up machine 24a and the back end flank detection image pick-up machine 24b. As for said threaded rod 52a, axial both ends are supported by the frame 26, enabling free rotation, and the motor 52d for a drive is connected with the end part.

[0030]The detailed composition of the holding means 60 of said belt conveyor device is shown in drawing 10 and drawing 11. As shown in drawing 10 (it is omitting in drawing 1), it faces on the conveyer belt outward trip 16a, and it meets in the conveyance direction of a strip member, and the beam 62 is installed and supported by the upper structure of the frame 26 at said belt conveyor device.

The rail 63 prolonged along with this beam 62 is allocated in the undersurface of this beam 62. The holding means 60 is supported via the movable frame 64 by this rail 63, and the holding means 60 is supported by this in the upper part of the strip member 10, and it moves to it along that conveyance direction.

[0031]That is, the movable frame 64 is movable to the longitudinal direction about the rail 63 by the informer stage which is not illustrated, and the up-and-down motion of it is attained in the holding means 60 by the ascending and descending means which is not illustrated. As shown in drawing 11, the slide bearing 65 which engages with said rail 63 slidably is allocated by the movable frame 64. A pair of level screw axes 66 in which the reverse screw was formed in the longitudinal direction both ends of said movable frame 64 were supported so that rotation was possible respectively, and these screw axis 66 is prolonged right-angled to the beam 62. In drawing 11, the numerals 67 are the screw blocks 67 screwed in said screw axis 66, respectively.

These screw blocks 67 are engaging with a pair of rails 68 attached to the movable frame 64 slidably, respectively.

69 is the motor fixed to the both ends of the movable frame 64, respectively, and the rotation driving force of these motors 69 is transmitted to said screw axis 66 via the belt pulleys 70 and 71 and the belt 72. And if said motor 69 operates and each screw axis 66 rotates to an opposite direction, only the equal distance will move screw block 67 comrades in the same direction. The screw axis 66, the screw block 67, the rail 68, the motor 69, the belt pulleys 70 and 71, and the belt 72 which were mentioned above constitute the displacement means 73 as a whole, and these displacement means 73 displace the grasped strip member 10 crosswise with the grasping tools 61 mentioned later. When said motor 69 operates and the screw axis 66 rotates in the same direction, only the equal distance moves to an opposite direction and screw block 67 comrades carry out approach isolation mutually.

[0032]The movable block 75 is fixed to said screw block 67, respectively, and the cylinder 76

parallel to the screw axis 66 is attached to the lower part of these movable blocks 75. The lower claw 78 is fixed at the tip of the piston rod 77 of each cylinder 76, and these lower claws 78 can engage with the undersurface of crosswise 1 side edge part of the strip member 10, and the undersurface of a side edge part besides the cross direction, respectively. And by projecting or withdrawing, the piston rod 77 of the cylinder 76 moves crosswise [of the strip member 10], and carries out approach isolation of each lower claw 78 of each other. 79 is the block fixed to the rod side of each cylinder 76, and the perpendicular cylinder 80 is being fixed to each block 79. The lower claw 78 and the upper claw 82 which makes a pair are connected at the tip of the piston rod 81 of each of these cylinders 80 so that rotation is possible, These upper claws 82 carry out approach isolation to the lower claw 78 corresponding by the operation of the cylinder 80, and grasp one side edge part and other end side edge part of a tip part of the strip member 10 from both sides with the lower claw 78. 83 is a stopper which performs the rotation stop of the upper claw 82. As a whole, the lower claw 78 mentioned above and the upper claw 82 constitute the grasping tools 61 which grasp the rear end part of this strip member 10, when the tip of the strip member 10 is stuck to the molding drum 12 by pressure. The head end of the cylinder 84 is connected with the central part of said movable frame 64 so that rotation is possible, and the sticking-by-pressure member 86 is connected at the tip of the piston rod 85 of this cylinder 84 so that rotation is possible. When it is located between said upper claws 82 and the piston rod 85 of the cylinder 84 projects, this sticking-by-pressure member 86 forces the strip member 10 on 12, and sticks it to a molding drum by pressure. The electric control device of the strip member feed unit of a work example comprises a sequence controller, a microcomputer, etc., and they omit the explanation and illustration for a well-known thing.

[0033]Next, the operation of the strip member feed unit of a work example is explained.

Drawing 12 is an operation explanatory view of the belt conveyor device 14 of said strip member feed unit. If the strip member 10 is carried in to the belt conveyor device 14 as shown in drawing 12 (a), first, this belt conveyor device 14 will lay the strip member 10 on the outward trip 16a of a conveyer belt, will circulate the conveyer belt 16, and will start conveyance to the direction of figure Nakaya seal c of this strip member 10. Then, if the member detector 40 detects the strip member 10, after after-detection predetermined time passes, as shown in (b) of drawing 12, conveyance of the strip member 10 will be stopped. This predetermined time is set as the timer.

It is set to the proper time that the tip part of the strip member 10 enters in the view of the front image pick-up machine group 22 at the time of a stop.

the case where this conveys the various strip members 10 from which length differs -- the tip part of each strip member 10 -- the inside of this view -- you can make it mostly located in the same point Therefore, even if the length of the strip member 10 differs, change does not arise by the measurement environment for measurement of each strip member 10 tip part.

[0034]The conveyer belt space formation means 18 and the back image pick-up machine group 24 move to behind in the position according to the standard length of strip member 10 size, before the strip member 10 is carried in to the belt conveyor device 14. In this case, when said standard length is not known beforehand. After a conveyance stop of the strip member 10, said conveyer belt space formation means 18 and the back image pick-up machine group 24 can be moved to the position according to the length of the strip member 10, and the rear end part of the strip member 10 can be put in in the view of the rear end part detection image pick-up machine 20 and the back image pick-up machine group 24. Therefore, even if the length of the strip member 10 differs, change does not arise by the measurement environment for measurement of each strip member 10 rear end part. The conveyer belt space formation means 18 and the back image pick-up machine group 24 need to synchronize those movements, and do not need to control them. It is possible to get to know these positions correctly.

[0035]When the strip member 10 is carried in to the belt conveyor device 14 and it stops, about the crosswise position of the strip member 10, centering must be carried out so that the image pick-up purpose portion of the strip member 10 may enter in the view of the front, the back image pick-up machine groups 22 and 24, and the rear end part detection image pick-up machine 20. Then, the strip member 10 which carried out centering to the belt conveyor device 14 beforehand is carried in, or centering is carried out while carrying in the strip member 10.

[0036]After detection conditions are ready as mentioned above, each part of the strip member 10 is detected. In this case, since the 2nd milky reference board 44 is allocated in the front end part of the belt conveyor device 14 as shown in drawing 6 thru/or drawing 8, the luminosity difference of the front end part of the strip member 10 and the 2nd reference board 44 becomes large, and white and black contrast become clear. Therefore, when edge, a side edge portion, etc. of a front end part of a central portion can detect clearly by the picture obtained by the front image pick-up machine group 22, for example, shrinkage arises in a strip member 10 cross-direction flank, it can respond appropriately. [of the strip member 10] Since the 2nd space 46 is formed in the front end part of the roller conveyor 34 when the front end part of the roller conveyor 34 has come out ahead from the front end part of the belt conveyor device 14, as shown in drawing 6, The front end part central portion of the strip member 10 can be detected without the roller conveyor 34 becoming obstructive. Since neither hanging down nor wrinkles produce the front end part of the strip member 10 below in this case, quality maintenance of a tire can be performed. Of course, when [anxious about hanging down] there is nothing, as shown in drawing 7, it is not necessary to take out the front end part of the roller conveyor 34 ahead from the front end part of the belt conveyor device 14.

[0037][the upper opening 35 of the conveyer belt space formation means 18] Since the milky reference board 36 is allocated as shown in drawing 3 or drawing 4, The rear end part of the strip member 10 can become, a luminosity difference with the first reference board 36

becomes large like said front end part, and it can respond to the shrinkage which the side edge portion of the rear end part of the strip member 10 could detect clearly, and produced in this side edge part by the picture obtained with the back flank detection image pick-up machine 24b appropriately. Since the rear end part surface of the strip member 10 is illuminated with the 2nd illuminator 38, the sign line of the surface of the strip member 10 is detectable by the picture obtained with the sign line image pick-up machine 24a.

[0038] Since it irradiates with reference light with the two Lighting Sub-Division machines 18f from the direction which became independent about 10b, respectively in the undersurface 10a and the rear end face of the rear end part of the strip member 10 as shown in said drawing 5, the ridgeline between the undersurface 10a of the strip member 10 and the rear end face 10b is made to come up, and it can clarify. Therefore, the image pick-up picture of the rear end part detection image pick-up machine 20 becomes that the ridgeline was clearly indicated to be, and, thereby, can detect the ridgeline of the rear end part which was not made conventionally with sufficient accuracy. Since the space 39 is formed in the portion near the conveyer belt space formation means 18 of the roller conveyor 34 as shown in drawing 4, the central part of the ridgeline of the rear end part of the strip member 10 can be detected without the roller conveyor 34 becoming obstructive. As mentioned above, since the front end part (especially edge) and rear end part (especially ridgeline) of the strip member 10 are detectable with the front image pick-up machine group 22 and the rear end part detection machine 20 which distance understands beforehand, the exact length of the strip member 10 is known.

[0039] Next, the operation of said server conveyor 27 and the conveyor up-and-down actuator 14c is explained. When the molding drum 12 replaces that from which a size differs, the server conveyor 27 rotates the up-and-down drive motor 48, and moves the server conveyor 27 up and down. This leads the strip member 10 to the purpose position of the peripheral surface of a molding drum. Rotation of the up-and-down drive motor 48 goes up or drops the passive-movement screw member 14c2 and the cylinder member 14c3 of the conveyor up-and-down actuator 14c. Under the present circumstances, since pressure is not impressed, only that cylinder goes up to the cylinder member 14c3, and a cylinder rod retreats and goes for it in this cylinder with the dignity of the roller conveyor 34 and the belt conveyor device 14. Therefore, in this state, the conveyance surface level of the server conveyor 27 and the conveyance surface level of the belt conveyor device 14 are not in agreement. Then, if pressure is impressed to the cylinder member 14c3, a cylinder rod goes up and the conveyance level of the front end of the roller conveyor 34 and the belt conveyor device 14 is in agreement with the conveyance level of the server conveyor 27. Thus, after each conveyors 27 and 34 and the conveyance level of 14 have been in agreement, the strip member 10 is turned to a molding drum, and is conveyed. In detection of the front end and the back end of the strip member 10, Since it is desirable to carry out under the same measurement environment. [at the time of the detection] Where the roller conveyor 34 and the belt conveyor device 14 are made into the

lowest position, without impressing pressure to said cylinder member 14c3, each detection of the front end part and rear end part of the strip member 10 is performed, and the length of the strip member 10 is detected from the detection result. Pressure is impressed to said cylinder member 14c3 after the detection, and each front end part of the roller conveyor 34 and the belt conveyor device 14 is raised.

[0040]If the length of the strip member 10 is detected as mentioned above, the rear end part or front end part, and rear end part of the strip member 10 will be grasped with the grasping tools 61 of drawing 10 which is not illustrated according to this detection information, and the holding means 60 shown in drawing 11. in this case -- responding to the length of the strip member 10 so that it may come on the space where strip member 10 rear end part is surrounded with the conveyer belt 16 -- the conveyance direction position of the conveyer belt space formation part 18 -- beforehand -- or it adjusts after strip member 10 conveyance. Since space (opening 35) is formed in the middle of the outward trip 16a of a conveyer belt of said space formation part 18 in the grasp of the rear end part of the strip member 10, Any trouble cannot be found, and the grasping tools 61 (the upper claw 82 and lower claw 78 grade) of the holding means 60 can be inserted from the side of the rear end part of the strip member 10 on a conveying path, and can be held. And the attachment position of the reference board 36 of that opening 35 can hold the rear end part of the strip member 10 smoothly with the grasping tools 61, without this reference board 36 also becoming trouble since it is located a little in a lower level from the level of the conveyer belt outward trip 16a. And the front end part is stuck on the molding drum 12 by being stuck by pressure by the crimp means which does not illustrate the front end part of the strip member 10, then -- pulling back strip member 10 rear end part currently grasped with the grasping tools 61 while twisting this strip member 10 around the molding drum 12, or taking it out ahead -- a volume -- the price is adjusted. That is, when too short, the strip member 10 is pulled, and when too long, its strip member 10 is drawn in.

[0041]As for the operation range of this invention, although the case where this invention was applied to the belt conveyor device used for the strip member feed unit in said work example was illustrated, it is needless to say that it is not limited to this. For example, arrangement and the number of each roller of a conveyer belt space formation means can be constituted so that it may not be limited to said work example, for example, a roller may be arranged in two and one lower part up, or they can be increased to the one middle.

[0042]

[Effect of the Invention]In order according to this invention to dent a conveyor belt below and to form space on the outward trip of a conveyor belt as explained above, it becomes easy to do the grasp of the rear end part of the part for band-like by grasping tools. The conveyance subject conveyed on the outward trip of a conveyor belt can be detected now from a lower part. Therefore, exact detection of the conveyance subject which was not made conventionally is enabled, and it becomes easy to do the rear end part grasp of a conveyance subject. If a

conveyance subject is used as a strip member, the back end is picturized and it enables it to detect, even if the back end cutting plane of the strip member is below suitable, the strip member back end can be detected correctly and the length of a strip member can be detected with still more sufficient accuracy. Therefore, the work stuck on the molding drum of a strip member is not overdue. If a subject detection means is made into what can move along the conveyance direction, When it is intermingled and conveys the strip member from which length differs, the position which suited the length of the strip member can be made to be able to move the position of a subject detection means before conveyance or during conveyance, it can accumulate, and the length of each strip member can be measured correctly.

[Brief Description of the Drawings]

[Drawing 1] It is the whole strip member feed unit lineblock diagram concerning the work example of this invention.

[Drawing 2] It is an II-II **** figure of drawing 1.

[Drawing 3] It is an III-III line sectional view of drawing 1.

[Drawing 4] It is x directional vision figure of drawing 1.

[Drawing 5] It is a V-V line cross-sectional-view figure of drawing 4, and is an example explanatory view of composition of a conveyor space formation means.

[Drawing 6] It is an explanatory view of the example of front end part composition of a roller conveyor and a belt conveyor device.

[Drawing 7] They are other explanatory views of the example of front end part composition of a roller conveyor and a belt conveyor device.

[Drawing 8] It is an explanatory view of the example of front end part composition of a roller conveyor and a belt conveyor device.

[Drawing 9] It is a composition explanatory view of a server conveyor.

[Drawing 10] It is an attachment state explanatory view of a holding means.

[Drawing 11] the detailed composition of a holding means is explained -- it is a section front view in part.

[Drawing 12] It is an operation explanatory view of a belt conveyor device, and, as for (a), (b) shows the state at the time of a stop at the time of conveyance.

[Drawing 13] It is a composition explanatory view of the conventional belt conveyor device.

[Explanations of letters or numerals]

10 Strip member

12 Molding drum

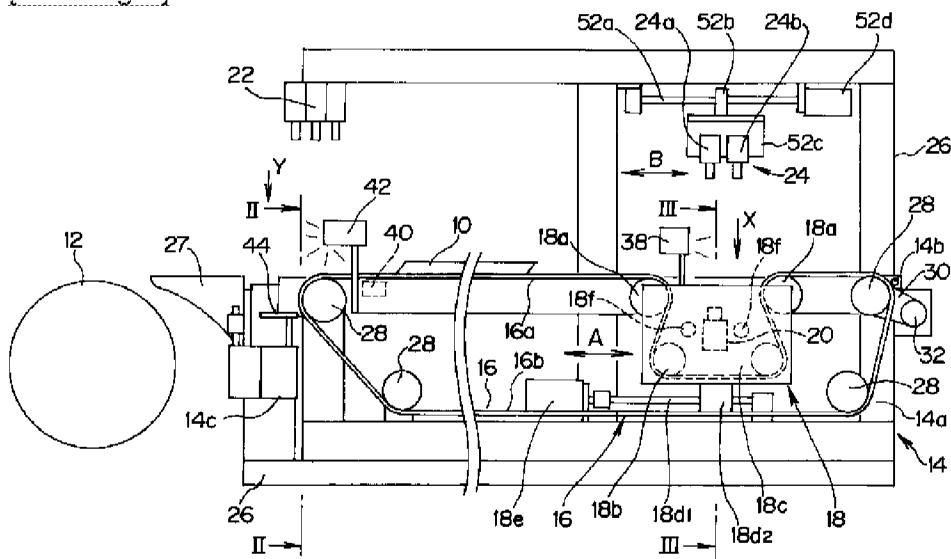
14 Belt conveyor device

16 Conveyer belt

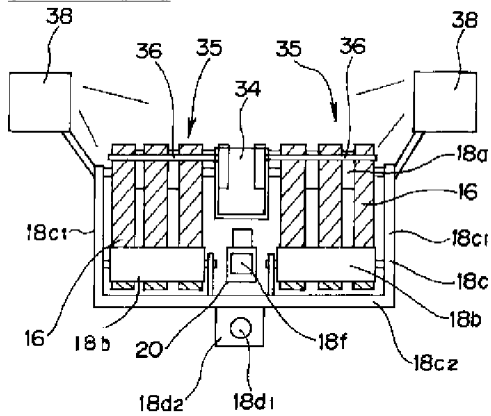
16a Outward trip

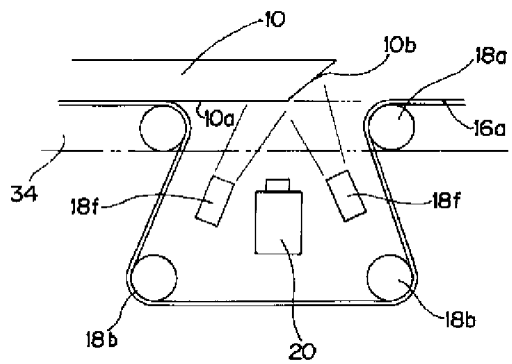
- 16b Return trip
 - 18 Conveyer belt space formation means
 - 18a Track carrier roller
 - 18b Lower roller
 - 18c Box member
 - 18 d Box member turning
 - 18e Drive motor
 - 18 f The 1st illuminator
 - 20 Rear end part detection image pick-up machine
 - 35 Opening
 - 60 Holding means
 - 61 Grasping tools
-

[Drawing 1]

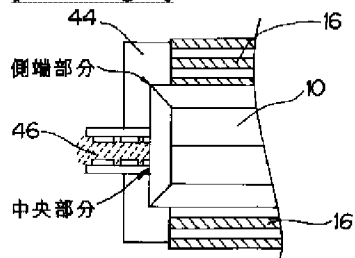


[Drawing 3]

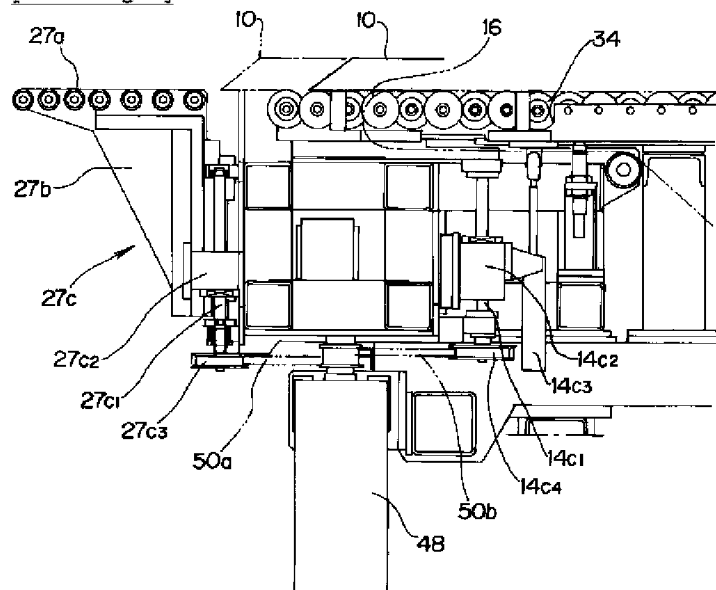




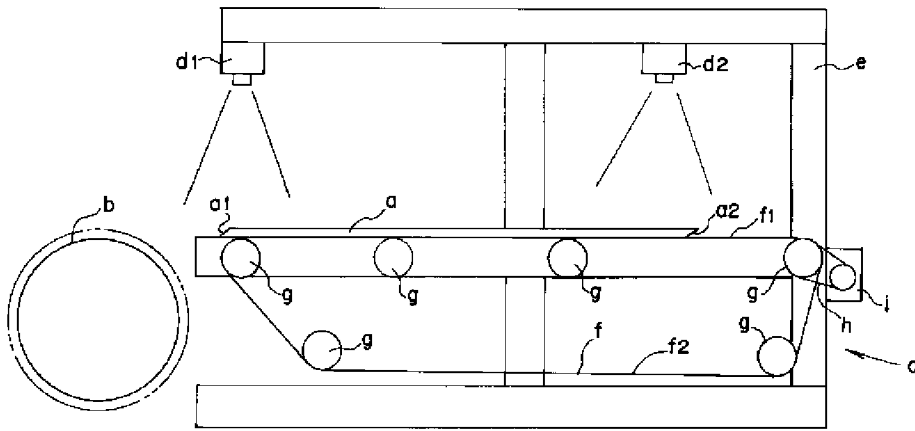
[Drawing 8]



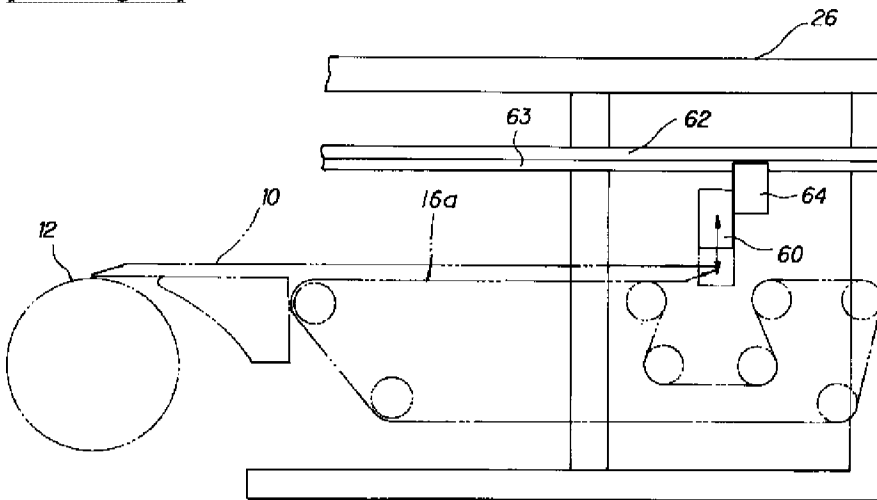
[Drawing 9]



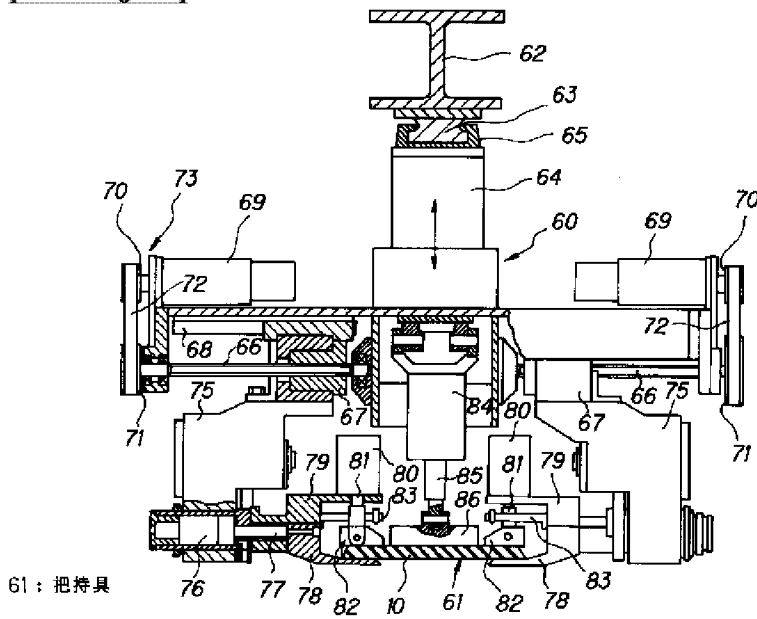
[Drawing 13]



[Drawing 10]

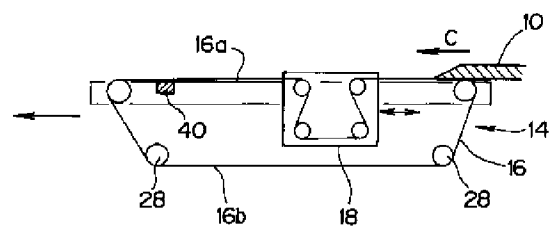


[Drawing 11]

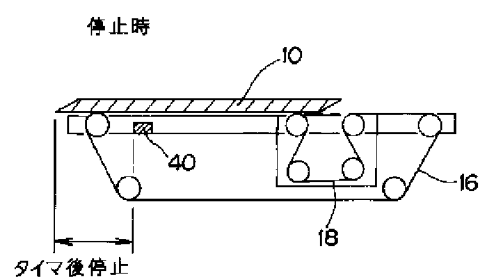


[Drawing 12]

(a)
搬送(移動)時



(b)



[Translation done.]